

=> file reg

FILE 'REGISTRY' ENTERED AT 18:59:20 ON 10 MAY 2005  
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=> display history full 11-

FILE 'REGISTRY' ENTERED AT 17:03:09 ON 10 MAY 2005

E SULFUR DIOXIDE/CN

L1 1 SEA "SULFUR DIOXIDE"/CN  
E OXYGEN/CN  
L2 1 SEA OXYGEN/CN

FILE 'HCA' ENTERED AT 17:07:11 ON 10 MAY 2005

L3 71514 SEA L1  
L4 3283 SEA L1/P

L5 362620 SEA L2  
L6 26318 SEA (LIQ# OR LIQUIF? OR LIQUEF? OR LIQUID? OR FLUID? OR  
FLUEF? OR MOLTEN? OR MELT? OR FUSE# OR FUSING# OR  
FUSION?) (2A) (L1 OR SULFUR# OR SULFER# OR SULPHUR# OR  
SULPHER# OR S OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8  
OR S9 OR S10)

FILE 'REGISTRY' ENTERED AT 17:07:24 ON 10 MAY 2005

E SULFUR/CN  
L7 1 SEA SULFUR/CN

FILE 'HCA' ENTERED AT 17:09:58 ON 10 MAY 2005

L8 131348 SEA L7  
L9 64 SEA (RETURN? OR RE(W) (ENTER? OR ENTRY? OR ENTRIED)) (2A) (L  
1 OR SO2 OR (SULFUR# OR SULFER# OR SULPHUR# OR SULPHER#) (W)  
DIOXIDE#)

FILE 'LCA' ENTERED AT 17:10:05 ON 10 MAY 2005

L10 2452 SEA (RECOVER? OR RECLAMAT? OR RECLAIM? OR RETRIEV? OR  
SALVAG? OR REGENERAT? OR RECONDITION? OR REFORM? OR  
RECONSTITUT? OR REUSE# OR REUSING# OR RECYCL? OR  
REPROCESS?) /BI,AB  
L11 4 SEA (RE(W) (COVER? OR CLAMAT? OR CLAIM? OR GENERAT? OR  
CONDITION? OR FORM? OR CONSTITUT? OR USE# OR USING# OR  
CYCL? OR PROCESS?)) /BI,AB

FILE 'HCA' ENTERED AT 17:12:10 ON 10 MAY 2005

L12 3442 SEA (L10 OR L11) (2A) (L1 OR SO2 OR (SULFUR# OR SULFER# OR

SULPHUR# OR SULPHER#) (W) DIOXIDE#)  
 L13 36 SEA L9 AND L3  
 L14 6 SEA L9 AND L4  
 L15 3 SEA L9 AND L5  
 L16 2 SEA L9 AND L6  
 L17 17 SEA L9 AND L12  
 L18 2841 SEA L12 AND L3  
 L19 679 SEA L12 AND L4  
 L20 91 SEA L12 AND L5  
 L21 84 SEA L18 AND L20  
 L22 19 SEA L21 AND L19  
 L23 6 SEA L21 AND L6  
 L24 24 SEA L21 AND L8  
 L25 1 SEA L21 AND L9  
 L26 13658 SEA (L2 OR OXYGENA? OR O2 OR OXYGEN# OR O) (2A) (PURE# OR  
       PURIF? OR PURIT?)  
 L27 121 SEA L3 AND L26  
 L28 18 SEA L27 AND L4  
 L29 26 SEA L27 AND L8  
 L30 63 SEA L27 AND L5  
 L31 8 SEA L27 AND L6  
 L32 0 SEA L27 AND L9  
 L33 12 SEA L27 AND L12

FILE 'LCA' ENTERED AT 18:30:52 ON 10 MAY 2005  
 L34 1545 SEA L2 OR OXYGENA? OR O2 OR (OXYGEN# OR O) (2A) (ATM# OR  
       ATMOS? OR GAS## OR GASEOUS? OR GASIF? OR FLOW? OR  
       STREAM? OR SOURC? OR SUPPLY OR SUPPLIED OR FURNISH? OR  
       APPLY? OR APPLIED OR APPLICATION? OR INLET? OR PORT OR  
       PORTS OR PORTAL? OR JET OR JETS OR SYRING? OR NEEDL?)  
 L35 1497 SEA L2 OR OXYGENA? OR O2 OR (OXYGEN# OR O) (2A) (TREAT? OR  
       PRETREAT? OR CONDITION? OR PRECONDITION? OR PROCESS? OR  
       INTRODUC?)

FILE 'HCA' ENTERED AT 18:38:51 ON 10 MAY 2005  
 L36 620148 SEA L34 OR L35 OR OXYGENA?  
 L37 11680 SEA (L3 OR SO2 OR (SULFUR# OR SULFER# OR SULPHUR# OR  
       SULPHER#) (W) DIOXIDE#) AND L36

FILE 'LCA' ENTERED AT 18:40:31 ON 10 MAY 2005  
 L38 32137 SEA (PRODUC? OR PROD# OR GENERAT? OR MANUF? OR MFR# OR  
       CREAT? OR FORM## OR FORMING# OR FORMAT? OR MAKE# OR  
       MADE# OR MAKING# OR FABRICAT? OR SYNTHESI? OR PREPAR? OR  
       PREP#)/BI,AB

FILE 'HCA' ENTERED AT 18:41:27 ON 10 MAY 2005  
 L39 15319 SEA (SO2 OR (SULFUR# OR SULFER# OR SULPHUR# OR SULPHER#) (W) DIOXIDE#) (2A)L38

L40 2056 SEA L37 AND (L4 OR L39)  
 L41 132 SEA L40 AND L6  
 L42 53 SEA L41 AND L8  
 L43 0 SEA L41 AND L9  
 L44 13 SEA L41 AND L12  
 L45 4 SEA L44 AND L42  
 L46 6 SEA L41 AND L26  
 L47 24 SEA L14 OR L15 OR L16 OR L23 OR L25 OR L31 OR L45 OR L46  
 L48 41 SEA (L22 OR L28 OR L33 OR L44) NOT L47  
 L49 27 SEA (L24 OR L29) NOT (L47 OR L48)  
 L50 24 SEA L47 AND (1900-2002/PY OR 1900-2002/PRY)  
 L51 40 SEA L48 AND (1900-2002/PY OR 1900-2002/PRY)  
 L52 24 SEA L49 AND (1900-2002/PY OR 1900-2002/PRY)

=> file hca  
 FILE 'HCA' ENTERED AT 18:59:29 ON 10 MAY 2005  
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=> d 147 1-24 cbib abs hitstr hitind

L47 ANSWER 1 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 137:386687 Process for **preparation** of **sulfur**  
**dioxide**. Garcia, Javier Angel Perez (Chile). Eur. Pat.  
 Appl. EP 1262451 A2 20021204, 4 pp. DESIGNATED STATES: R: AT, BE,  
 CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT,  
 LV, FI, RO, MK, CY, AL, TR. (English). CODEN: EPXXDW.  
 APPLICATION: EP 2002-253829 20020530. PRIORITY: CL 2001-1267  
 20010531.

AB A process is provided for **prodn.** of **SO<sub>2</sub>** by  
 combustion of S and **pure O<sub>2</sub>** in a closed system  
 that produces a high yield in the **recovery** of **SO<sub>2</sub>**  
 and that decreases environmental contamination to levels below the  
 std. requirements. The **pure O<sub>2</sub>** is dild. before  
 combustion in a recirculated combustion gas that was previously  
 cooled to maintain combustion at <1,200.degree.. The combustion gas  
 is cooled, purified, and liquefied, and the non-liquefied gas is  
 recirculated in a closed system. A combustion gas having a high  
**SO<sub>2</sub>** content (e.g., 84 vol.% **SO<sub>2</sub>**) can thus be  
 obtained, which is easily liquefied to a high **SO<sub>2</sub>**  
**recovery** efficiency (e.g., 95% at -10.degree.). Preferably,  
 S is smelted in a heat exchanger and burned with **O<sub>2</sub>** in a  
 combustion chamber of a boiler. The combustion gas driven by

✓ US 6,75,413  
 see 6,75,413 (EP pub)

suction from a blower is cooled in a heat exchanger and a purifier/cooler. At a fork point, a portion of the gas is recirculated to a mixing point, where the **pure O<sub>2</sub>** is added. The remaining portion of the gas is liquefied in a cooling unit to **form liq. SO<sub>2</sub>**, leaving a non-condensable gaseous mixt. that is returned to the circuit via a mixing point.

IT 7446-09-5P, **Sulfur dioxide, preparation**  
(manuf. by combustion of sulfur with oxygen and subsequent liquefaction)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7704-34-9, **Sulfur, reactions** 7782-44-7, **Oxygen, reactions**  
(manuf. by combustion of sulfur with oxygen and subsequent liquefaction)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC C01B017-54  
CC 49-2 (Industrial Inorganic Chemicals)  
ST **sulfur dioxide manuf**  
**liquefaction**  
IT 7446-09-5P, **Sulfur dioxide, preparation**  
(manuf. by combustion of sulfur with oxygen and subsequent liquefaction)  
IT 7704-34-9, **Sulfur, reactions** 7782-44-7, **Oxygen, reactions**  
(manuf. by combustion of sulfur with oxygen and subsequent liquefaction)

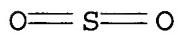
ammonium biphosphate and sulfur dioxide. Li, Wei; Xiao, Wende; Dai, Xiaoying (East China University of Science and Technology, Shanghai, 200237, Peop. Rep. China). Liusuan Gongye (5), 30-31 (Chinese) 1999. CODEN: LIGOEH. ISSN: 1002-1507. Publisher: Liusuan Gongye Bianjibu.

AB The prepn. of  $(\text{NH}_4)_2\text{HPO}_4$  and  $\text{SO}_2$  from byproduct  $\text{SO}_3$  was studied by combining tail gas adsorption process of  $\text{H}_2\text{SO}_4$  prodn. with  $(\text{NH}_4)_2\text{HPO}_4$  prodn. Gas contg. 8-9%  $\text{SO}_2$  was returned to  $\text{H}_2\text{SO}_4$  prodn. The technol. can be used in most of phosphate fertilizer factories in China.

IT 7446-09-5P, Sulfur dioxide, preparation  
(prodn. of ammonium biphosphate and sulfur dioxide by phosphorolysis of ammonium sulfite)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 49-5 (Industrial Inorganic Chemicals)

IT 7446-09-5P, Sulfur dioxide, preparation 7722-76-1P,  
Ammonium biphosphate  
(prodn. of ammonium biphosphate and sulfur dioxide by phosphorolysis of ammonium sulfite)

L47 ANSWER 3 OF 24 HCA COPYRIGHT 2005 ACS on STN  
131:201870 Synthesis of liquid sulfur trioxide with high-purity oxygen at atmosphere pressure. Zhao, Rubi; Shang, Shude; Cai, Chongji; Pan, Baoning (Nanjing Tianli Institute of Applied Chemical Technology, Peop. Rep. China). Faming Zhanli Shengqing Gongkai Shuomingshu CN 1134396 A 19961030, 12 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 1995-110962 19950309.

AB Liq.  $\text{SO}_3$  is manufd. with 99.5%  $\text{O}_2$  and pure  $\text{SO}_2$  at atm. pressure.  $\text{O}_2$  and pure  $\text{SO}_2$  are introduced into a circulating system and mixed with circulating gas at room temp. and  $<0.03$  MPa, the mixed gases are heat-exchanged with hot reacted gas from a converter to reach catalyst active reaction temp. and are reacted in the presence of V in the converter, the produced gas  $\text{SO}_3$  is condensed into liq.  $\text{SO}_3$  with  $\text{H}_2\text{O}$  and air in a condenser, uncondensed  $\text{SO}_3$  gas and un-reacted  $\text{SO}_2$  gas are recycled to the reaction system.

IT 7446-09-5, Sulfur dioxide, reactions  
7782-44-7, Oxygen, reactions  
(synthesis of liq. sulfur trioxide with high-purity oxygen at atm. pressure)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM C01B017-76

CC 49-8 (Industrial Inorganic Chemicals)

ST sulfur trioxide liq synthesis atm pressure

IT 7446-11-9P, Sulfur trioxide, preparation  
(liq.; synthesis of liq. sulfur  
trioxide with high-purity oxygen at  
atm. pressure)

IT 7446-09-5, Sulfur dioxide, reactions

7782-44-7, Oxygen, reactions  
(synthesis of liq. sulfur trioxide  
with high-purity oxygen at atm.  
pressure)

L47 ANSWER 4 OF 24 HCA COPYRIGHT 2005 ACS on STN

130:340471 Operation technology for COG desulfurization. Chang, Ben-Nan  
(Iron Refining Plant, China Steel Corp., Taiwan). Jishu Yu Xunlian,  
24(1), 108-120 (Chinese) 1999. CODEN: CSYLDY. ISSN: 0254-5888.

Publisher: China Steel Corp..

AB To comply with increasingly strict environmental stds., the Phase 3  
coal chem. plant of CSC was erected on 1993, by Still-Otto company  
(Germany); previous plants (Phases 1 and 2) were erected in 1995.  
Currently these 2 plants are in smooth operation and successfully  
minimized SOx emissions produced by COG (coke-oven gas) combustion.  
The desulfurization plants of all three plants use a modified Claus  
process to remove potential pollutants and recover sulfur. After  
scrubbing NH3, H2S, and HCN from the crude COG, these compds. are  
stripped out by steam in a distn. unit and sent to a decompr. oven  
and a Claus reactor, equipped with different solid catalysts, in  
which the NH3, H2S, HCN, CnHm are burned and converted to N2, H2,  
CO2, H2O, SO2, and molten sulfur. The produced  
waste gases, together with N2, H2, CO2, H2O, and traces of H2S and  
SO2 are returned to suction mains of COG stream  
for rescrubbing. The entire process is operated in a closed-loop to  
prevent release into the atm., and the purified COG is sent  
downstream for combustion. The SOx emissions are <300 ppm.

CC 51-19 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 49

(SUS 5/204,082)

L47 ANSWER 5 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 118:127705 Process for the manufacture of high-purity **sulfur dioxide** by oxidation of **molten sulfur**  
 with oxygen.. Schendel, Ronald L. (Braun, C. F., Inc., USA). Eur. Pat. Appl. EP 524017 A1 19930120, 13 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, MC, NL, PT, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1992-306589 19920717. PRIORITY: US 1991-732110 19910718.

AB The process comprises combusting **molten S** with an O-contg. **gas**, passing the S(g)-contg. gaseous effluent through a 1st cooling zone to cool the effluent to >600.degree., sepg. the S(l) from the vapor, and returning the S(l) to the combustion chamber.

IT 7704-34-9, Sulfur, reactions  
 (combustion of molten, submerged, with **oxygen-contg. gas**, for high-purity **sulfur dioxide**)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7782-44-7  
 (combustion, submerged, of **molten sulfur**, with **oxygen-contg. gas**, for high-purity **sulfur dioxide, recycling** of condensed **molten sulfur** in)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O==O

(**gases** contg., submerged combustion with, of **molten sulfur**, for high-purity **sulfur dioxide**)

IT 7446-09-5P, **Sulfur dioxide, preparation**  
 (manuf. of high-purity, by submerged combustion of **molten sulfur** with **oxygen-contg. gas**)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O==S==O

IC ICM C01B017-54  
CC 49-2 (Industrial Inorganic Chemicals)  
ST molten sulfur submerged combustion oxygen;  
sulfur dioxide sulfur oxidn oxygen  
IT Recycling  
(of molten sulfur, in high-purity  
sulfur dioxide manuf. by submerged  
combustion of molten sulfur with  
oxygen-contg. gas)  
IT Oxidation  
(submerged, of molten sulfur, with  
oxygen-contg. gas, for high-purity  
sulfur dioxide, recycling of  
condensed molten sulfur in)  
IT Combustion  
(submerged, of molten sulfur, with  
oxygen-contg. gas, for high-purity  
sulfur dioxide, recycling of  
condensed molten sulfur in)  
IT 7704-34-9, Sulfur, reactions  
(combustion of molten, submerged, with oxygen-contg.  
gas, for high-purity sulfur dioxide)  
IT 7782-44-7  
(combustion, submerged, of molten sulfur,  
with oxygen-contg. gas, for high-purity  
sulfur dioxide, recycling of  
condensed molten sulfur in)  
IT 7782-44-7, Oxygen, uses  
(gases contg., submerged combustion with, of  
molten sulfur, for high-purity sulfur  
dioxide)  
IT 8004-13-5, Dowtherm  
(heat transfer fluid, in high-purity sulfur  
dioxide manuf. by submerged combustion of  
molten sulfur with oxygen-contg.  
gas and recycling of condensed molten  
sulfur)  
IT 7446-09-5P, Sulfur dioxide,  
preparation  
(manuf. of high-purity, by submerged combustion of  
molten sulfur with oxygen-contg.  
gas)

L47 ANSWER 6 OF 24 HCA COPYRIGHT 2005 ACS on STN

113:209248 Changes in hemoglobin concentration and oxygen saturation in  
healthy and inflamed human gingivae following brushing. Hanioka,  
Takashi; Nagata, Hideki; Murakami, Yukitaka; Shizukuishi, Satoshi  
(Fac. Dent., Osaka Univ., Osaka, 530, Japan). Koku Eisei Gakkai

Zasshi, 40(2), 224-31 (Japanese) 1990. CODEN: KEGZA7. ISSN: 0023-2831.

AB Hb concn. (Hb index) and oxygen satn. (SO<sub>2</sub> index) in papillary gingivae were assayed using a noninvasive tissue reflectance spectrophotometer. Measurements were made before and continuously after brushing in a standardized manner. In healthy gingivae, the Hb index increased by 30-40% and then decreased by 10-20% from baseline within the first 5 min after the release of pressure from brushing. The SO<sub>2</sub> index increased significantly between 1 and 30 min after brushing. The Hb index and SO<sub>2</sub> index returned to baseline within 60 and 90 min after brushing, resp. In inflamed gingivae, changes in the Hb index and the SO<sub>2</sub> index showed patterns similar to those in healthy gingivae. The Hb index reached min. level of 10 min after brushing and did not recover during the monitoring period. A significant increase in SO<sub>2</sub> index was obsd. between 5 and 10 min after brushing. In conclusion, tooth brushing caused a rapid increase followed by a decrease in Hb concn. and an increase in oxygen satn. in gingivae, and these microvascular responses occurred slowly in inflamed gingivae.

IT 7782-44-7, Oxygen, biological studies  
(Hb satn. with, of gingivae, tooth brushing effect on, inflammation in relation to, in humans)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O—O

CC 14-7 (Mammalian Pathological Biochemistry)  
Section cross-reference(s): 13

IT 7782-44-7, Oxygen, biological studies  
(Hb satn. with, of gingivae, tooth brushing effect on, inflammation in relation to, in humans)

L47 ANSWER 7 OF 24 HCA COPYRIGHT 2005 ACS on STN  
113:81555 Sulfur recovery from elementary sulfur-containing material.  
Bielz, Siegfried; Fitting, Arno (Metallgesellschaft A.-G., Germany).  
Ger. Offen. DE 3900069 A1 19900705, 7 pp. (German). CODEN:  
GWXXBX. APPLICATION: DE 1989-3900069 19890103.

AB The title process comprises treating the S-contg. material in a recirculating fluidized bed with O-free hot gas to evap. the S, charging the bed with S-contg. material having particle size <3 mm, and, alter desensitizing the S-contg. gas, condensing the S from the gas, and purging some of the S-free gas, heating the remaining part of the S-free gas in a fluidized-bed cooler by indirect heat transfer with hot combustion gases and recirculating the heated gas as primary gas to the fluidized bed, while controlling the temp. in the heat exchanger such that the av.

temp. of the gas in the fluidized bed is  $\geq 50$  degree. higher than the deriv. point of the S-contg. carrier gas. This method gives max. S yield at min. heat energy consumption.

IT 7704-34-9P, Sulfur, preparation  
(recovery of, from elementary sulfur-contg. material, carrier gas recirculation in)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5P, Sulfur dioxide,  
preparation  
(sulfur recovery from, by evapn. in recirculating  
fluidized bed)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-027  
ICS B01J008-24  
ICA B01D053-34  
CC 49-1 (Industrial Inorganic Chemicals)  
ST sulfur evapn fluidized bed; heat exchange gas  
fluidized bed  
IT 7664-93-9P, Sulfuric acid, preparation  
(manuf. of, in sulfur-recovery from elementary sulfur  
-contg. material, fluidized bed-evapn. in)  
IT 7704-34-9P, Sulfur, preparation  
(recovery of, from elementary sulfur-contg. material, carrier gas  
recirculation in)  
IT 7446-09-5P, Sulfur dioxide,  
preparation 7783-06-4P, Hydrogen sulfide, preparation  
(sulfur recovery from, by evapn. in recirculating  
fluidized bed)

L47 ANSWER 8 OF 24 HCA COPYRIGHT 2005 ACS on STN

111:60738 Comparing regenerative sulfur

dioxide sorbents using thermogravimetry: the SRO [sulfation,  
regeneration, oxidation] test. Duisterwinkel, A. E.; Doesburg, E.  
B. M.; Hakvoort, G. (Lab. Phys. Chem., Delft Univ. Technol., Delft,  
2628 BL, Neth.). Thermochimica Acta, 141, 51-9 (English) 1989.  
CODEN: THACAS. ISSN: 0040-6031.

AB Several synthetic Ca aluminates and titanates, as sorbents for  
regenerative desulfurization in the fluidized-bed combustion. of

coal were investigated by thermogravimetry for their sulfation, regeneration, and cyclic behavior. The SRO test, as a rapid and reliable test for screening sorbents, is superior to pilot plant testing because of the smaller size samples, which permits a more flexible exptl. approach, esp. for long-term behavior.

IT 7782-44-7  
 (combustion, fluidized-bed, of coal, sulfur dioxide removal in, calcium aluminate and calcium titanate as regenerative sorbents for)  
 RN 7782-44-7 HCA  
 CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous  
 (removal of, in fluidized-bed coal combustion, calcium aluminate and calcium titanate as regenerative sorbents in)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

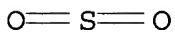
O=S=O

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)  
 IT Sorbents  
 (calcium aluminate and calcium titanate, for **sulfur**  
 dioxide, in **fluidized**-bed coal combustion)  
 IT 7782-44-7  
 (combustion, fluidized-bed, of coal, sulfur dioxide removal in, calcium aluminate and calcium titanate as regenerative sorbents for)  
 IT 7446-09-5, Sulfur dioxide, uses and miscellaneous  
 (removal of, in fluidized-bed coal combustion, calcium aluminate and calcium titanate as regenerative sorbents in)

L47 ANSWER 9 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 110:176146 Sulfur recovery from hydrogen sulfide containing stream.  
 Palm, John W. (Amoco Corp., USA). U.S. US 4798716 A 19890117, 9  
 pp. Cont. of U.S. Ser. No. 857,009, abandoned. (English). CODEN:  
 USXXAM. APPLICATION: US 1987-134574 19871207. PRIORITY: US  
 1984-605498 19840430; US 1986-857009 19860429.  
 AB A process for the recovery of S from a gaseous stream contg. H<sub>2</sub>S  
 comprises (a) introducing a thermal reaction mixt. of H<sub>2</sub>S-contg.  
 gaseous stream and an O-rich air stream or **pure O**  
 into a combustion zone of a Claus furnace, (b) producing hot  
 combustion gases comprising H<sub>2</sub>S, SO<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, and S, (c)  
 introducing the combustion gases into a Claus catalytic reactor, (d)

producing a Claus plant gaseous effluent stream comprising H<sub>2</sub>S, SO<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, and S, (e) producing liq. S, which is recovered, and a gaseous condenser effluent, (f) converting all S species in the gaseous condenser effluent to H<sub>2</sub>S, (g) removing H<sub>2</sub>O in the condenser effluent by condensation, and (h) moderating the temp. in the furnace by using part of the dried condenser effluent from (g) as diluent which is returned to step (a). The temp. of the combustion zone of the furnace, in the absence of the diluent streams is >2600 .degree.F. The total diluent/O mol ratio is 1:10 to 10:1. Thus, an acid gas comprising 67 mol% H<sub>2</sub>S and 33 mol% CO<sub>2</sub> and a stream of 95 5mol% O and 5 mol% N were introduced into a Claus furnace. The calcns. indicated that the overall S recovery was significantly increased and furnace and reactor temps. were decreased.

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous (sulfur manuf. from, by Claus process, diln. in, for decreased temps.)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC ICM C01B017-04  
 INCL 423574000R  
 CC 49-9 (Industrial Inorganic Chemicals)  
 IT 7446-09-5, Sulfur dioxide, uses and miscellaneous (sulfur manuf. from, by Claus process, diln. in, for decreased temps.)

L47 ANSWER 10 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 109:213173 Sulfur recovery from Claus plant tail gas using regenerable metal oxide absorbent. McGalliard, Russell L. (Amoco Corp., USA). U.S. US 4769229 A 19880906, 9 pp. (English). CODEN: USXXAM.  
 APPLICATION: US 1986-912023 19860925.  
 AB The title process comprises adding ZnO-based absorbent to an absorber to produce a laden (sulfided) absorbent (ZnS) and a gaseous stream contg. decreased S compd. concns. The ZnO absorbent is regenerated in a regenerator by withdrawing a portion of the gaseous stream upstream of the absorber, blending it with an O-contg. stream, and allowing this gaseous mixt. to come in contact with the laden ZnO absorbent. The regeneration effluent stream comprising mainly SO<sub>2</sub> is returned to the Claus S-recovery plant. Use of absorber feed as a source of diluent for O during regeneration decreases the absorption rate in the absorber, allowing regeneration to be conducted at a lower rate, decreases the recycle rate of regenerator effluent to the Claus plant, and increases the concn. of S and S compds. Alternatively, the decrease in absorption

rate is advantageously translated into decrease in the size of the absorber required.

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation of, in regeneration of zinc oxide absorbent for  
cleaning Claus tail gas)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
ICS B01D053-34  
INCL 423574000R  
CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 47  
IT 7446-09-5P, Sulfur dioxide, preparation  
(formation of, in regeneration of zinc oxide absorbent for  
cleaning Claus tail gas)

L47 ANSWER 11 OF 24 HCA COPYRIGHT 2005 ACS on STN  
108:223876 Improved sulfur recovery process from Claus tail gas using  
metal oxide absorbent. Pendergraft, Paul Thomas; Lee, Min Hsiun  
(Amoco Corp., USA). Eur. Pat. Appl. EP 260798 A2 19880323, 24 pp.  
DESIGNATED STATES: R: AT, BE, CH, DE, ES, FR, GB, IT, LI, LU, NL,  
SE. (English). CODEN: EPXXDW. APPLICATION: EP 1987-306861  
19870803. PRIORITY: US 1986-893111 19860804.

AB The tail gas from a Claus plant is fed to an addnl. Claus catalytic  
reaction zone operated under suitable conditions (160-330.degree.F)  
for depositing a major portion of the S on the Claus catalyst. The  
stream exiting the zone is then introduced into a 1st absorption  
zone contg. ZnO absorbent, to produce a sulfided absorbent and an  
effluent gas. The effluent and stoichiometric amt. of O<sub>2</sub> are then  
introduced into a 2nd absorption zone for a period, during which ZnS  
is converted to ZnO. The effluent from this stage comprising  
SO<sub>2</sub> is returned to the Claus plant. The process  
greatly reduces the vol. of the regeneration effluent returned to  
the Claus plant for reprocessing and, hence, achieves significant  
economic benefits.

IT 7782-44-7, Oxygen, uses and miscellaneous  
(in sulfur recovery, from Claus tail gas)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM B01D053-34

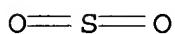
ICS C01B017-04  
 CC 49-1 (Industrial Inorganic Chemicals)  
 IT 7782-44-7, Oxygen, uses and miscellaneous  
 (in sulfur recovery, from Claus tail gas)

L47 ANSWER 12 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 91:61950 Tail gas oxidation. Matsuda, Shinpei; Imahashi, Jinichi; Kato, Akira; Nakajima, Fumito (Babcock-Hitachi K. K., Japan). Jpn. Kokai Tokkyo Koho JP 54032168 19790309 Showa, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1977-97770 19770817.

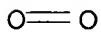
AB S compds. in tail gas from S-recovery unit is oxidized with O in the presence of a catalyst to SO<sub>2</sub> which is subsequently scrubbed with a Na, K, or NH<sub>4</sub> sulfite soln. The O is added (1-2)-times of its stoichiometric amt. The catalyst consists of .gtoreq.50% TiO<sub>2</sub> and balance .gtoreq.1 oxides of Mo, W, Cr, V, Fe, Co, Ni, Cu, or Bi. The spent scrubbing soln. is heated to **recover SO<sub>2</sub>** which is **returned** to the S-recovery units. The method is useful in the Claus process. Thus, metatitanic acid-NH<sub>4</sub> molybdate tablets were heated at 450.degree. to prep. TiO<sub>2</sub>-MoO<sub>2</sub> catalyst of Ti-to-Mo at. ratio 9. A gas contg. H<sub>2</sub>S 1, O<sub>2</sub> 2, H<sub>2</sub>O 30%, and balance N was passed through the catalyst at 300.degree.. The SO<sub>2</sub> formation was >99% and **SO<sub>2</sub> recovery** from a sulfite soln. was >90%.

IT 7446-09-5P, preparation  
 (formation in recycle of, in hydrogen sulfide catalytic oxidn. in Claus tail-gas)

RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IT 7782-44-7, reactions  
 (oxidn. by, of hydrogen sulfide in Claus tail-gas, catalysts for)  
 RN 7782-44-7 HCA  
 CN Oxygen (8CI, 9CI) (CA INDEX NAME)



IC B01D053-34  
 CC 59-2 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 49  
 IT Waste gases  
 (Claus tail-gas, hydrogen sulfide oxidn. in, **sulfur dioxide recycle** from, oxygen and catalyst in)  
 IT 7446-09-5P, preparation  
 (formation in recycle of, in hydrogen sulfide catalytic oxidn. in

Claus tail-gas)

IT 7782-44-7, reactions

(oxidn. by, of hydrogen sulfide in Claus tail-gas, catalysts for)

L47 ANSWER 13 OF 24 HCA COPYRIGHT 2005 ACS on STN

90:170916 Highly concentrated **sulfur dioxide** from sulfur. Mukhlenov, I. P.; Soroko, V. E.; Vasil'ev, B. T.; Bartov, A. T.; Borisov, V. M.; Vorotnikov, A. G.; Egorov, P. A.; Ilgisonis, I.; Kuzichkin, N. V.; et al. (Leningrad Technological Institute, USSR). U.S.S.R. SU 644725 19790130 From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1979, (4), 76. (Russian). CODEN: URXXAF. APPLICATION: SU 1975-2120938 19750404.

AB To manuf. high-concn. **SO<sub>2</sub>** by reaction of pure O with S vapor at a decreased temp., the O is bubbled through the melt at the S boiling temp., and the vapors are oxidized in a fluidized layer of an inert material or catalyst, and both stages are carried out at 1-35 atm.

IT 7446-09-5P, preparation

(manuf. of high-concn., sulfur evapn. in oxygen for)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, uses and miscellaneous (sulfur vaporization into, for high-concn. **sulfur dioxide manuf.**)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC C01B017-54

CC 49-2 (Industrial Inorganic Chemicals)

ST **sulfur dioxide manuf**; oxidn sulfur

IT 7446-09-5P, preparation

(manuf. of high-concn., sulfur evapn. in oxygen for)

IT 7782-44-7, uses and miscellaneous

(sulfur vaporization into, for high-concn. **sulfur dioxide manuf.**)

IT 7704-34-9, uses and miscellaneous

(vaporization of, into oxygen, for high-concn. **sulfur dioxide manuf.**)

L47 ANSWER 14 OF 24 HCA COPYRIGHT 2005 ACS on STN

86:194411 Apparatus and method for separation and recovery of sulfur

dioxide from waste gases. Duvall, Lee Joseph (USA). Ger. Offen. DE 2631444 19770224, 21 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1976-2631444 19760713.

AB The process involves cooling and compressing the waste gases sufficiently to liquefy the SO<sub>2</sub> and H<sub>2</sub>O in the gases. The liquefied SO<sub>2</sub> and H<sub>2</sub>O are then sepd. from the gases by proper control of the temp. and pressure. Part of the sepd. SO<sub>2</sub> is returned to the system to aid in the sepn.

IT 7446-09-5P, preparation  
(recovery of, from waste gas by cooling and compressing)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC B01D005-00

CC 59-2 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 49

ST sulfur dioxide recovery waste gas; liquefied  
sulfur dioxide recovery

IT 7446-09-5P, preparation  
(recovery of, from waste gas by cooling and compressing)

L47 ANSWER 15 OF 24 HCA COPYRIGHT 2005 ACS on STN

85:7844 Sulfur dioxide from sulfur and oxygen.

(Hoechst A.-G., Fed. Rep. Ger.). Ger. Offen. DE 2433231 19760129, 9 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1974-2433231 19740711.

AB SO<sub>2</sub> is made by the simultaneous combustion of com. pure O<sub>2</sub> and finely distributed liq. S without diln. by SO<sub>2</sub> at mole ratio O<sub>2</sub>/S = 1.0-1.55 and 1-7 bar. Thus, 90 kg/hr liq. S and 92-96 kg/hr O<sub>2</sub> (excess 3-7%) are burned in a circular nozzle burner with an attached cooling coil and asbestos lining. Max. flame temp. is 1950.degree., temp. of combustion chamber wall 1400.degree., and gas temp. after cooling 280.degree.. The product contained 0.13-1.78 vol.% SO<sub>3</sub>, depending of the O<sub>2</sub> excess.

IT 7446-09-5P, preparation  
(from liq. sulfur, by combustion with oxygen)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC C01B

CC 49-3 (Industrial Inorganic Chemicals)  
 ST sulfur burning **sulfur dioxide**  
 IT 7446-09-5P, preparation  
 (from liq. **sulfur**, by combustion with oxygen)

L47 ANSWER 16 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 84:140191 Sulfur removal from hydrogen sulfide-poor waste gases. LUCAS process. Bratzler, Karl; Doerges, Alexander; Schlauer, J. (Forschungslab., Lurgi Mineraloeltech. G.m.b.H., Frankfurt/Main, Fed. Rep. Ger.). Erdöl und Kohle, Erdgas, Petrochemie vereinigt mit Brennstoff-Chemie, 29(1), 19-22 (German) 1976. CODEN: EKBAK. ISSN: 0367-0716.

AB Tail gases from Claus plants contg. <299 ppm SO<sub>2</sub> [7446-09-5] and H<sub>2</sub>S [7783-06-4] were incinerated with low surplus of air, treated in a coke reactor at 380.degree. to reduce SO<sub>3</sub> to SO<sub>2</sub> and to remove H<sub>2</sub>S, and treated with Na<sub>2</sub>HPO<sub>4</sub> soln. to absorb SO<sub>2</sub>. The concd. SO<sub>2</sub> released was **returned** to the Claus plant or catalytically reduced to S.

IT 7446-09-5P, uses and miscellaneous  
 (recovery of, from waste gases, by Lucas process)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
 IT 7446-09-5P, uses and miscellaneous  
 (recovery of, from waste gases, by Lucas process)

L47 ANSWER 17 OF 24 HCA COPYRIGHT 2005 ACS on STN

84:21693 Treatment of waste gas from Claus process. Tsuruta, Hidemasa (Nittetsu Chemical Engineering Ltd., Japan). U.S. US 3895101 19750715, 6 pp. (English). CODEN: USXXAM. APPLICATION: US 1974-477511 19740607.

AB Claus process tail gas was heated at 600.degree. with a 1.5 ratio of air and oxidized by combustion in the presence of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> [7783-20-2] soln. The SO<sub>2</sub> [7446-09-5] formed in the tail gas was absorbed in (NH<sub>4</sub>)<sub>2</sub>SO<sub>3</sub> [10196-04-0] soln., which was then heated. The liberated SO<sub>2</sub> was **returned** to the process and the NH<sub>4</sub> sulfite was recycled.

IT 7446-09-5P, preparation  
 (from Claus tail gas)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC C01B  
 INCL 423574000  
 CC 59-2 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 49  
 IT 7446-09-5P, preparation  
 (from Claus tail gas)

L47 ANSWER 18 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 78:99846 High-pressure process for sulfur dioxide and sulfuric acid.  
 Kojima, Shoji; Brauder, T. J., Jr. (Mamehara Manufg., Inc.; Parsons, Ralph M., Co. of Asia). Jpn. Tokkyo Koho JP 47032506 B4 19720819 Showa, 4 pp. (Japanese). CODEN: JAXXAD. APPLICATION: JP 1970-121275 19701229.

AB Liq. S, pure O, and a diluent of recycled SO<sub>2</sub>, at >6 atm was continuously converted to 10-95% SO<sub>2</sub> at 1204-1442.degree. in a combustion chamber. The SO<sub>2</sub> was partly liquefied by cooling and the remainder (10-14% SO<sub>2</sub>) was rapidly converted to SO<sub>3</sub> over a V catalyst with >99% efficiency; the high O/SO<sub>2</sub> ratio of >6 reduced the initial reaction temp. to 370.degree. and reduced the amt. of catalyst consumed to 1/7 that originally needed. Absorbents were unnecessary and air pollution was reduced.

IT 7446-09-5P, preparation  
 (continuous high-pressure process for)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC C01B  
 CC 49-2 (Industrial Inorganic Chemicals)  
 IT 7446-09-5P, preparation 7664-93-9P, preparation  
 (continuous high-pressure process for)

L47 ANSWER 19 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 76:74337 Use of oxygen for combustion of sulfur in the process of sulfur dioxide liquid production  
 . Banczyk, Leon; Wesolowski, Juliusz; Grobelny, Aleksander (Inst. Chem. Nieorg., Zakl. Kwasu Siarkowego, Lubon/Poznan, Pol.). Przemysl Chemiczny, 50(12), 818-21 (Polish) 1971. CODEN: PRCHAB. ISSN: 0033-2496.

AB Pilot plant expts. on the production of liq. SO<sub>2</sub> by the combustion of S in O<sub>2</sub>, involving the purification of the reaction gases by absorbing SO<sub>3</sub> in concd. H<sub>2</sub>SO<sub>4</sub>, followed by condensation of the unabsorbed SO<sub>2</sub>, are discussed. The quality of the final product meets the stds.

required of **SO<sub>2</sub>** used in the manuf. of food products.  
 IT **7446-09-5P**, preparation  
     (from sulfur, absorption of sulfur trioxide and condensation in)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 49 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 17  
 ST **sulfur dioxide liq**  
 IT Absorption  
     (of sulfur trioxide, in liq. sulfur  
     dioxide manuf.)  
 IT **7446-09-5P**, preparation  
     (from sulfur, absorption of sulfur trioxide and condensation in)

L47 ANSWER 20 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 74:89216 Sulfur from gases containing hydrogen sulfide. Wernicke, Hans  
 J.; Reitzenstein, Hermann (Messer Griesheim G.m.b.H.; Friedrich Uhde  
 GmbH). Ger. Offen. DE 1941703 19710304, 9 pp. (German). CODEN:  
 GWXXBX. APPLICATION: DE 1969-1941703 19690816.  
 AB The Claus process for the S manuf. is extended to gas mixts. contg.  
 <15 -20% H<sub>2</sub>S. Thus, **SO<sub>2</sub> generated** by combustion  
 of liq. S with O or an O-rich  
 gas in a jet burner reacts with the H<sub>2</sub>S-contg. initial gas  
 mixt. at 1:2 **SO<sub>2</sub> -H<sub>2</sub>S** ratio in the mixing chamber of a  
 steam boiler to give .apprx.70% S (with respect to S introduced)  
 which after condensation is drawn off. The residual gases are  
 conducted through 2 reaction chambers in series to give 100%  
 conversion liq. S part of which is  
 recycled to the **SO<sub>2</sub> generation**.  
 IT **7704-34-9P**, preparation  
     (from hydrogen sulfide, with double auxiliary contact furnace)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC C01B  
 CC 49 (Industrial Inorganic Chemicals)  
 IT **7704-34-9P**, preparation  
     (from hydrogen sulfide, with double auxiliary contact furnace)

L47 ANSWER 21 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 54:43909 Original Reference No. 54:8566f-g Obtaining sulfur dioxide

from high-furnace slag. Jicinsky, Jaroslav; Zajic, Miloslav; Juranek, Jan CS 90967 19590715 (Unavailable). APPLICATION: CS .

AB Blowing O or a mixt. of O with air through a liquid S-contg. slag yields SO<sub>2</sub>, which is absorbed and worked up as usual.

IT 7446-09-5, Sulfur dioxide (manuf. of, from S-contg. slags by blowing with air-O mixt. or O)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, Oxygen (sulfur dioxide recovery from slags by blowing with)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

CC 9 (Metallurgy)

IT 7446-09-5, Sulfur dioxide (manuf. of, from S-contg. slags by blowing with air-O mixt. or O)

IT 7782-44-7, Oxygen (sulfur dioxide recovery from slags by blowing with)

L47 ANSWER 22 OF 24 HCA COPYRIGHT 2005 ACS on STN

52:96963 Original Reference No. 52:17012h-i,17013a-b Processing high-phosphorus and high-sulfur-containing charges in the basic electric-arc furnace by using **pure oxygen**.

Ludemann, Karl Friedrich (Met. Inst. Frieberg/Sachsen, Germany). Frieberger Forschungsh., B26, 16-36 (Unavailable) 1958.

AB The possibility of direct processing of bloomery loops to steel (in East Germany) was investigated. Three modes were tried: (1) melting nonalloyed. C-poor steels in the elec. arc furnace with **pure O** under gradual increase of the proportion of bloomery loops in the charge from 31 to 57%; (2) investigation of the possibility of fast dephosphorization and desulfurization in elec.-arc furnace melts with more than 90% bloomery loop charge, and (3) testing the steels obtained from bloomery loop melts with regard to their mech. properties and toughness, especially at low temps. The equipment, methods of investigation and compn. of the materials used are described in detail. Two melts with about 90% bloomery loops charge could be dephosphorized in a short time to very low final values, while the desulfurization was insufficient. The

desulfurization during the **application** of O goes on in 2 stages: the usual desulfurization characterized by the passage of the S from the steel melt into the lime-phosphate slag, and the direct combustion of the S of the melt by the introduced O with **formation** of

SO<sub>2</sub>. In the presence of slags oversatd. with lime a rough desulfurization to 0.04-0.09% can be obtained, so that an addnl. fine desulfurization is necessary. Notch-impact toughness and mech. properties of steels made with different bloomery loop charges (steels St 42 and MST 4) were not inferior to open-hearth steel of similar compn. Al-killed steels of the former type are both cold-proof and aging-resistant. 20 references.

CC 9 (Metallurgy and Metallography)

L47 ANSWER 23 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 46:50066 Original Reference No. 46:8335c-d Sulfuric acid and **liquid sulfur** dioxide manufactured from smelter gases at Copper Cliff, Ontario. Allgood, R. W. (Can. Inds. Ltd., Copper Cliff, ON). Transactions - the Canadian Institute of Mining and Metallurgy and the Mining Society of Nova Scotia, 55, From: Can. Mining Met. Bull. No. 479, 153-5 (Unavailable) 1952. CODEN: TCIMAT. ISSN: 0371-5701.

AB Detailed tech. description of 150 ton/day contact H<sub>2</sub>SO<sub>4</sub> plant. Liquid SO<sub>2</sub> will be produced from 75% SO<sub>2</sub> gas resulting from "flash-smelting" of ore concentrates with O instead of air.

IT 7782-44-7, Oxygen  
 (in copper smelting with **SO<sub>2</sub> recovery**)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O—O

IT 7446-09-5, **Sulfur** dioxide  
 (liquid, manuf. from smelter gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)

IT 7782-44-7, Oxygen  
 (in copper smelting with **SO<sub>2</sub> recovery**)

IT 7446-09-5, **Sulfur** dioxide  
 (liquid, manuf. from smelter gases)

L47 ANSWER 24 OF 24 HCA COPYRIGHT 2005 ACS on STN

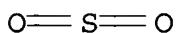
42:30575 Original Reference No. 42:6501d-e **Liquid**  
**sulfur dioxide and oleum.** Danti, Mario IT 412747 19460216  
 (Unavailable). APPLICATION: IT .

AB **Melted S** is burned under pressure with  
 pure O. The heat of the reaction is utilized by a  
 special boiler. Thereafter, SO<sub>2</sub> is vaporized and mixed with O for  
 SO<sub>3</sub> production. The process is recommended for its room saving.

IT **7446-09-5, Sulfur dioxide**  
 (liquid, manuf. of, and oxidation thereof to SO<sub>3</sub>)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)  
 IT **7446-09-5, Sulfur dioxide**  
 (liquid, manuf. of, and oxidation thereof to SO<sub>3</sub>)

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L51 ANSWER 1 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 140:341674 Method for the automated manufacture of pure SO<sub>2</sub> from sulfur  
 and oxygen. Labrana, Valdivia Oscar David; Hanke, Altmann Hans  
 (Quimetal Industrial S.A., Chile). U.S. Pat. Appl. Publ. US  
 2004086451 A1 20040506, 10 pp. (English). CODEN: USXXCO.  
 APPLICATION: US 2003-601600 20030624. PRIORITY: CL 2002-2545  
 20021106.

AB Liq. SO<sub>2</sub> having a purity of >99.9% is produced by an automated  
 process from elemental sulfur and **pure oxygen**,  
 in the presence of SO<sub>2</sub> recirculated from the closed circuit prodn.  
 system itself. The temp. of the sulfur is controlled by pre-defined  
 S, O<sub>2</sub> and SO<sub>2</sub> ratios. The automation is made based on oxygen  
 sensors and on sulfur and SO<sub>2</sub> flow meters with their resp. control  
 connections and proportional valves permitting a fine control of the  
 sulfur combustion reaction. The sulfur is entered into the  
 combustion chamber at 130-135.degree. maintained by a steam produced  
 in a multistep heat exchanger post-combustion chamber. The  
 combustion chamber is maintained at preferably 1160.+-50.degree..  
 The liquefaction of the gaseous SO<sub>2</sub> produced is carried out  
 alternatively by a cool plant working between -10 and -60.degree. or  
 with a compression unit working at a pressure between 3.8 and 5.0  
 bar. Small amts. of SO<sub>3</sub> formed during combustion are removed by  
 countercurrent absorption in a 98% H<sub>2</sub>SO<sub>4</sub> tower. The automation  
 permits an optimum temp. control and a clean prodn. of SO<sub>2</sub>.

IT **7446-09-5P, Sulfur dioxide, preparation**  
 (automated manuf. of pure SO<sub>2</sub> from sulfur and oxygen)

*(this case)*

RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-54  
INCL 423543000  
CC 49-8 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 47  
IT 7446-09-5P, Sulfur dioxide, preparation  
(automated manuf. of pure SO<sub>2</sub> from sulfur and oxygen)

L51 ANSWER 2 OF 40 HCA COPYRIGHT 2005 ACS on STN  
139:9120 Power generation in **oxygen**-enriched  
**atmosphere** with flue gas recirculation for reduced air  
pollution and liquefied gas byproducts. Hsu, Justin Chin-Chung  
(USA). U.S. US 6574962 B1 20030610, 8 pp. (English). CODEN:  
USXXAM. APPLICATION: US 2001-990360 20011123.

AB An integrated conceptual power plant burns fuel in an **oxygen**  
-enriched **gas stream** in a combustion furnace and  
converts air pollutant emissions and carbon dioxide into byproducts.  
The combustion gas stream, after leaving an economizer of a steam  
generation system, is split into two streams, stream A and stream B.  
Stream A recirculates back to the combustion furnace through the  
first flue gas recirculation fan for combustion temp. control.  
Stream B, after passing through a dust collector for fly ash  
removal, a series of condensers for byproduct recovery, and the  
second flue gas recirculation fan, mixes with an **oxygen**  
-enriched **stream** from an air sepn. unit and flows back to  
the combustion furnace. The plant does not need an exhaust stack  
and does not discharge combustion gases into the atm. The byproduct  
condensers sep. out and condense NO<sub>2</sub>, CO<sub>2</sub>, and SO<sub>2</sub>.  
First-stage combustion is carried out in a water-wall combustion  
furnace, a refractory-wall combustion furnace, or a conventional  
combustion furnace, using coal, wood, refuse-derived fuel, fossil  
fuels, natural gas, or any combustible waste as fuel. The dust and  
acid gas removal system includes a wet cyclone, a wet  
multiple-cyclone collector, a dry cyclone, a dry multiple-cyclone  
collector, a packed bed absorber, a venturi scrubber, a baghouse, or  
an electrostatic precipitator.

IT 7446-09-5P, Sulfur dioxide,  
preparation  
(liq., recovery of; power generation in  
**oxygen**-enriched **atm.** with flue gas  
recirculation for reduced air pollution and liquefied gas  
byproducts)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM F01K025-06

INCL 060649000; 060651000; 060671000

CC 51-12 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 59, 60

IT Filters

(bags; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Flue dust

(capture and removal of; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Municipal refuse

Wood waste

(combustion of; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Natural gas, processes

(combustion of; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Steam

(generation of; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Cyclone separators

(of flue dust; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Scrubbing

(of flue gases; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Combustion

(of fossil fuels and wastes, in **oxygen**-enriched **atm**.; power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Electrostatic precipitation apparatus

Power

(power generation in **oxygen**-enriched **atm**. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT Combustion gases  
(recirculation of; power generation in oxygen-enriched atm. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

IT 124-38-9P, Carbon dioxide, preparation 7446-09-5P,  
**Sulfur dioxide, preparation**  
10102-44-0P, Nitrogen dioxide, preparation  
(liq., recovery of; power generation in oxygen-enriched atm. with flue gas recirculation for reduced air pollution and liquefied gas byproducts)

L51 ANSWER 3 OF 40 HCA COPYRIGHT 2005 ACS on STN  
138:225760 Method and apparatus for processing of combustion products.  
Akchurin, Kh. I.; Yazovtsev, V. V.; Klimin, O. V.  
(Spetsializirovannaya Organizatsiya po Proektirovaniyu, Montazhu i Naladke Gazoispol'zuyushchego i Kotel'nogo Oborudovaniya, Russia).  
Russ. RU 2183984 C1 20020627, No pp. given (Russian).  
CODEN: RUXXE7. APPLICATION: RU 2000-129300 20001122.

AB The app. contains following components located in succession along a gas-and-water passage: a contact condenser or a contact-surface condenser, a degasifier, a supply compressor, and a cryst. hydrator which has circulation loops for an initial soln. and cold and hot heat-transfer agents. The forced circulation loop for the initial soln. is connected to the degasifier through the supply compressor and to a gas reservoir and is provided with a compressor. The forced circulation loop for the heat-transfer agents is connected to atm. air and includes a compressor and autonomous sources of cold and heat. Waste gases are absorbed in the condenser at such pressure when the condensation temp. of H<sub>2</sub>O(g) is equal to 90-100.degree.; a condensate is degassed in the degasifier at atm. pressure; condensation of H<sub>2</sub>O(g) and adsorption of sepd. gases are effected in the cryst. hydrator by means of the initial soln.; the cryst. hydrates of each agent are formed due to change and control of temp. and pressure of the initial soln.; the cryst. hydrates are melted, and pure substances thus obtained are sepd. from water. The arrangement provides an enhanced economical efficiency. Concd. H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>, pure CO<sub>2</sub> and SO<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub> are recovered from the combustion products. The system is suitable for cleaning of flue gases in boilers, industrial furnaces, and thermal engines operating with gaseous, liq., and org. fuels.

IT 7446-09-5P, **Sulfur dioxide, preparation**  
7782-44-7P, Oxygen, preparation  
(recovery in processing of flue gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM B01D053-14  
CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 49, 52  
ST flue gas treatment sulfuric acid recovery; nitric acid recovery flue gas treatment; carbon dioxide recovery flue gas treatment; nitrogen recovery flue gas treatment; **sulfur dioxide recovery** flue gas treatment; oxygen recovery flue gas treatment  
IT 124-38-9P, Carbon dioxide, preparation 7446-09-5P,  
**Sulfur dioxide**, preparation 7664-93-9P, Sulfuric acid, preparation 7697-37-2P, Nitric acid, preparation 7727-37-9P, Nitrogen, preparation 7782-44-7P, Oxygen, preparation  
(**recovery** in processing of flue gases)

L51 ANSWER 4 OF 40 HCA COPYRIGHT 2005 ACS on STN

137:48842 Selective oxidesulfurization of Cl-organosulfur compounds over supported metal oxide catalysts. Choi, Sukwon; Wachs, Israel E. (ZCSS and Department of Chemical Engineering, Lehigh University, Bethlehem, PA, 18015, USA). Preprints of Symposia - American Chemical Society, Division of Fuel Chemistry, 47(1), 138-139 (English) 2002. CODEN: PSADFZ. ISSN: 1521-4648.

Publisher: American Chemical Society, Division of Fuel Chemistry.  
AB A catalytic process scheme was developed to convert byproducts from the pulp and paper mills to feedstocks. A key intermediate reaction step is the selective catalytic oxidn. of Cl-organosulfur compds. (COS). The kinetics and mechanism were studied of the selective oxidn. of COS, CS<sub>2</sub> and CH<sub>3</sub>SH over sulfur-tolerant vanadia (V2O<sub>5</sub>) catalysts. The catalysts were prep'd. by the incipient wetness impregnation of supports TiO<sub>2</sub>, ZrO<sub>2</sub>, Nb<sub>2</sub>O<sub>5</sub>, CeO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, and SiO<sub>2</sub>. The turnover frequency for COS and CS<sub>2</sub> oxidn. varied by about one order of magnitude depending on the support, in the order CeO<sub>2</sub> > ZrO<sub>2</sub> > TiO<sub>2</sub> > Nb<sub>2</sub>O<sub>5</sub> > Al<sub>2</sub>O<sub>3</sub> - SiO<sub>2</sub>. All reactions exhibited a zero-order dependence on the oxygen partial pressure.

IT 7446-09-5P, Sulfur oxide (SO<sub>2</sub>), preparation  
(selective oxidative desulfurization of organosulfur compds. over metal oxide supported vanadia catalysts for recovery of chem. feedstocks in the paper industry)

RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, Oxygen, reactions  
(selective oxidative desulfurization of organosulfur compds. over metal oxide supported vanadia catalysts for recovery of chem. feedstocks in the paper industry)

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 43, 67  
ST organosulfur compd selective oxidesulfurization vanadia catalyst oxide support; **sulfur dioxide recovery**  
pulping byproduct feedstock manuf; selective oxidesulfurization organosulfur compd pulping feedstock manuf  
IT 7446-09-5P, Sulfur oxide (SO<sub>2</sub>), preparation  
(selective oxidative desulfurization of organosulfur compds. over metal oxide supported vanadia catalysts for recovery of chem. feedstocks in the paper industry)  
IT 74-93-1, Methanethiol, reactions 75-15-0, Carbon disulfide, reactions 7704-34-9D, Sulfur, org. compds. 7782-44-7, Oxygen, reactions  
(selective oxidative desulfurization of organosulfur compds. over metal oxide supported vanadia catalysts for recovery of chem. feedstocks in the paper industry)

L51 ANSWER 5 OF 40 HCA COPYRIGHT 2005 ACS on STN  
135:36558 Process for recovering sulfur compounds from waste gases.  
Watson, Richard William; Gravilles, Stephen Rhys (BOC Group PLC, UK). Eur. Pat. Appl. EP 1106572 A2 20010613, 9 pp.  
DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2000-310452 20001124. PRIORITY: GB 1999-29330 19991210.

AB Sulfur is recovered from a 1st gas stream comprising hydrogen sulfide and at least 50 vol.% of ammonia and from a 2nd gas stream comprising hydrogen sulfide but essentially no ammonia, the 1st gas stream, the 2nd gas stream, and combustion supporting gas comprising at least one stream of essentially **pure oxygen** or **oxygen-enriched air** are fed to a single combustion zone or a plurality of combustion zones in parallel with each other

without premixing of combustible gas with oxygen or air, and creating in the or each combustion zone at least one region in which thermal cracking of ammonia takes place, and taking from the reactor an effluent gas stream including sulfur vapor, sulfur dioxide, and hydrogen sulfide, but essentially no residual ammonia.

IT 7446-09-5P, Sulfur dioxide, processes  
(process for recovering sulfur compds. from waste gases)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 49  
IT 7446-09-5P, Sulfur dioxide, processes 7704-34-9DP, Sulfur,  
compds., processes 7704-34-9P, Sulfur, processes 7783-06-4P,  
Hydrogen sulfide (H<sub>2</sub>S), processes  
(process for recovering sulfur compds. from waste gases)

L51 ANSWER 6 OF 40 HCA COPYRIGHT 2005 ACS on STN  
134:233995 Apparatus generating oxygenated chemical radicals and industrial applications thereof. Calone-Bonneau, Marguerite Gabrielle (Bordeau, Philippe, Fr.). PCT Int. Appl. WO 2001018188 A2 20010315, 22 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (French). CODEN: PIXXD2. APPLICATION: WO 2000-FR2438 20000905.

PRIORITY: FR 1999-11314 19990907.

AB The invention concerns a novel app. for enzymic prodn. of oxygenated free chem. radicals in liq. or gas form specifically adapted to various industrial purposes. The app. comprising a sealed chamber contg. immobilized enzymes of plant, microbial or animal origin, belonging to the oxidoreductase group. The device, after various oxygen-contg. chem. compns. and enzyme substrates have been introduced into the chamber, enables the generation of a concd. and continuous flux of oxygenated free chem. radicals and oxidized substrates having biocidal activity. Said biocidal products are applied, in liq. or gas form and in sufficient concn. levels, for decontaminating food products (milk and milk products, meat, fruits and vegetables, beverages), for cleaning and disinfecting equipment (containers, tools, machines, fabrics, packages) and industrial

premises, for detoxication and sanitizing water and air, and for destructive treatment of org. waste.

IT 7446-09-5P, Sulfur dioxide, biological studies  
 (app. generating oxygenated chem. radicals and industrial applications thereof)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C12N011-00  
 CC 9-1 (Biochemical Methods)  
 Section cross-reference(s): 7, 17, 59, 60, 61  
 IT Air purification  
 Apparatus  
 Disinfectants  
 Wastewater treatment  
 (app. generating oxygenated chem. radicals and industrial applications thereof)  
 IT 3170-83-0P, Hydroperoxyl radical 3352-57-6P, Hydroxyl radical, biological studies 7446-09-5P, Sulfur dioxide, biological studies 7446-11-9P, Sulfur trioxide, biological studies 7790-92-3P, Hypochlorous acid 10028-15-6P, Ozone, biological studies 10102-43-9P, Nitric oxide, biological studies 10102-44-0P, Nitrogen dioxide, biological studies 10544-73-7P, Dinitrogen trioxide 11062-77-4P, Superoxide anion 14691-52-2P, Peroxynitrous acid 15181-46-1P 19059-14-4P, Peroxynitrite 63296-34-4P, Cyanosulfoxylate 80475-45-2P, Cyanosulfite 80475-46-3P, Cyanosulfate  
 (app. generating oxygenated chem. radicals and industrial applications thereof)

L51 ANSWER 7 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 131:245214 Apparatus for manufacturing sulfuric acid. Kamenoen, Shoichi (Ishikawajima-Harima Heavy Industries Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 11263607 A2 19990928 Heisei, 5 pp.  
 (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-63227 19980313.

AB In the manuf. of sulfuric acid by combusting sulfur to give SO<sub>2</sub>, oxidizing SO<sub>2</sub> to SO<sub>3</sub>, and adsorbing SO<sub>3</sub> by dil. H<sub>2</sub>SO<sub>4</sub>, the app. comprises means for supplying combustion-supporting gas such as O<sub>2</sub> into the combustion furnace, circulating lines for directing the exhaust gas from adsorption tower into combustion furnace, and means for recovering SO<sub>2</sub> exited from the combustion furnace and using its energy as electricity source.

IT 7782-44-7, Oxygen, processes  
 (app. for manufg. sulfuric acid comprising means for supplying)  
 RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5P, Sulfur dioxide, preparation  
(generation of sulfur oxides in manufg. sulfuric acid as driving power sources)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-74  
CC 49-2 (Industrial Inorganic Chemicals)  
ST sulfuric acid manuf exhaust gas circulating line; **sulfur dioxide energy recovery**; oxygen supplying line  
sulfuric acid manuf app  
IT 7782-44-7, Oxygen, processes  
(app. for manufg. sulfuric acid comprising means for supplying)  
IT 7446-09-5P, Sulfur dioxide, preparation  
(generation of sulfur oxides in manufg. sulfuric acid as driving power sources)

L51 ANSWER 8 OF 40 HCA COPYRIGHT 2005 ACS on STN

131:186980 Apparatus and method for purification of sulfur dioxide.  
Koda, Hideyuki; Kajiwara, Yuji; Okawa, Jun (Sumitomo Seika K. K., Japan). Jpn. Kokai Tokkyo Koho JP 11228114 A2 19990824 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-24128 19980205.

AB SO<sub>2</sub> gas contg. impurities and unreacted S and O<sub>2</sub> is **purified** by sepg. S from the SO<sub>2</sub> feed gas by cooling, liquefying the treated SO<sub>2</sub>, further sepg. S by distn. under pressure, cooling the gas contg. SO<sub>2</sub> and O<sub>2</sub> obtained from the top of the distn. column, and sepg. SO<sub>2</sub> from O<sub>2</sub> by cooling. High-purity SO<sub>2</sub> gas is manufd. at low cost with high efficiency.

IT 7446-09-5P, Sulfur dioxide, preparation  
(app. and method for purifn. of sulfur dioxide)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-56  
CC 49-8 (Industrial Inorganic Chemicals)  
ST sulfur dioxide **purifn oxygen** removal app

IT **7446-09-5P**, Sulfur dioxide, preparation  
(app. and method for purifn. of sulfur dioxide)

L51 ANSWER 9 OF 40 HCA COPYRIGHT 2005 ACS on STN

121:38635 A new process for oxygen generation step for the hydrogen producing sulfur-iodine thermochemical cycle. Oeztuerk, I. T.; Hammache, A.; Bilgen, E. (Ec. Polytech., Univ. Montreal, Can.). Chemical Engineering Research and Design, 72(A2), 241-50 (English) 1994. CODEN: CERDEE. ISSN: 0263-8762.

AB A new design, and thermodn. and engineering analyses of the H<sub>2</sub>SO<sub>4</sub> decompn. section of the S-I thermochem. cycle for producing H is described. Excess O is used as heat transfer fluid in various direct contact adiabatic equipment. Shell and tube heat exchangers are eliminated as much as possible. Thermodn. (energy and exergy) and cost analyses were carried out. Energetic and exergetic efficiencies are 64.2 and 64.0%, resp. and typical cost is \$3.3 (1990)/kmol SO<sub>2</sub>, for \$4 U.S. (1990)/GJ nuclear heat cost.

IT **7782-44-7P**, Oxygen, preparation  
(manuf. of, in sulfur-iodine thermochem. cycle with nuclear heat source, in added step)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT **7446-09-5P**, Sulfur dioxide, reactions  
(recovery and reaction of, in sulfur-iodine thermochem. cycle, for sulfuric acid regeneration)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 71

IT **7782-44-7P**, Oxygen, preparation  
(manuf. of, in sulfur-iodine thermochem. cycle with nuclear heat source, in added step)

IT **7446-09-5P**, Sulfur dioxide, reactions  
(recovery and reaction of, in sulfur-iodine thermochem. cycle, for sulfuric acid regeneration)

L51 ANSWER 10 OF 40 HCA COPYRIGHT 2005 ACS on STN

118:151482 Converting of copper, nickel, and copper-nickel mattes in horizontal unit. Shalygin, L. M.; Bumazhnov, F. T.; Smirnov, Yu. M.; Savva, V. P.; Gul'tyaev, S. V.; Galushko, O. Ya.; Serebryany,

Ya. L.; Seregin, S. Ya.; Kondyrev, E. S.; et al. (Leningrad Mining Institute, USSR). U.S.S.R. SU 1721109 A1 19920323 From: Izobreteniya 1992, (11), 90. (Russian). CODEN: URXXAF. APPLICATION: SU 1990-4780479 19900109.

AB Molten matte, cold feed, and quartz flux are charged into a horizontal converter, and the resulting sulfide melt is blown with continuous removal of SO<sub>2</sub>-contg. gases and periodic removal of slag. Productivity is increased and wear of refractories is prevented for decreased process cost by blowing through 2 layers of tuyeres situated below and above the melt. The lower tuyeres are used for blowing with air or low-O<sub>2</sub> gas mixes. The upper tuyeres are situated at 40-50.degree. angle from the melt surface, and are used for blowing with enriched air contg. 21-50% O<sub>2</sub> and fed at 15-30% of total. Concn. of the SO<sub>2</sub> in exit gas is increased.

IT 7782-44-7, Oxygen, reactions  
(oxidn. with, of molten mattes in horizontal converter, two levels of tuyeres for blowing control in)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5P, Sulfur dioxide, preparation  
(recovery of, from matte converters, oxygen blowing control for)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C22B015-06

CC 54-2 (Extractive Metallurgy)

IT 7782-44-7, Oxygen, reactions  
(oxidn. with, of molten mattes in horizontal converter, two levels of tuyeres for blowing control in)

IT 7446-09-5P, Sulfur dioxide, preparation  
(recovery of, from matte converters, oxygen blowing control for)

L51 ANSWER 11 OF 40 HCA COPYRIGHT 2005 ACS on STN  
117:238970 System for removal of hydrogen sulfide from waste gases. Watson, Richard William (BOC Group PLC, UK). Eur. Pat. Appl. EP 500320 A1 19920826, 22 pp. DESIGNATED STATES: R: AT, BE, DE, FR, GB, IT, NL, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1992-301321 19920218. PRIORITY: GB 1991-3382 19910219.

AB H<sub>2</sub>S-contg. waste gases are preheated in a heat exchanger and portion

of the H<sub>2</sub>S is burnt in a furnace to form SO<sub>2</sub> and water vapor; **pure O** or O-enriched air is used to support combustion. The SO<sub>2</sub> reacts with the residual H<sub>2</sub>S to form further water vapor and a S vapor which is removed from the waste gas in a condenser. The waste gas stream is then divided into 1st and 2nd subsidiary streams. The H<sub>2</sub>S content of the 1st subsidiary stream is totally converted to SO<sub>2</sub> in an incinerator using **pure O** or O-enriched air to support its combustion. Water vapor is removed from the 1st subsidiary stream in the condenser and the resulting SO<sub>2</sub>-rich gas stream is recycled to the furnace. The 2nd subsidiary stream is subjected to a plurality of stages of catalytic reaction between H<sub>2</sub>S and SO<sub>2</sub> to form further S vapor which is then removed.

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation of, in removal of hydrogen sulfide from waste gases)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
ICS B01D053-34  
CC 59-4 (Air Pollution and Industrial Hygiene)  
IT 7446-09-5P, Sulfur dioxide, preparation  
(formation of, in removal of hydrogen sulfide from waste gases)

L51 ANSWER 12 OF 40 HCA COPYRIGHT 2005 ACS on STN  
117:215584 Manufacture of sulfuric acid from oxygen and sulfur by noncatalytic process. Masseling, Jacobus J. H.; Netzer, David (Parsons, Ralph M., Co., USA). PCT Int. Appl. WO 9214678 A1 19920903, 32 pp. DESIGNATED STATES: W: AU, BR, CA, JP, KR, RU; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1992-US1435 19920224. PRIORITY: US 1991-661847 19910226; US 1991-785271 19911030; US 1991-793100 19911115.

AB O-rich gas stream contg. >75 vol.% O and a feed of **recycled** SO<sub>2</sub> gas stream comprising >50 vol.% SO<sub>2</sub> are combusted at 700-1000.degree. and .1toreq.35 kg/cm<sup>2</sup> to form a SO<sub>3</sub> gas stream contg. 5-15 vol.% SO<sub>3</sub>, the SO<sub>3</sub>-contg. gas stream is passed through a SO<sub>3</sub>-absorption zone to form H<sub>2</sub>SO<sub>4</sub> and to produce a SO<sub>2</sub>-contg. gas stream which is compressed to form the **recycled** SO<sub>2</sub> gas stream, and the H<sub>2</sub>SO<sub>4</sub> is removed.

IT 7446-09-5P, Sulfur dioxide, preparation  
(in noncatalytic manuf. of sulfuric acid, from oxygen and sulfur)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

US cited in  
Perez  
Bartia

O=S=O

IT 7782-44-7, Oxygen, reactions  
(reaction of, with sulfur, in noncatalytic manuf. of sulfuric acid)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM C01B017-74  
CC 49-2 (Industrial Inorganic Chemicals)  
IT 7446-09-5P, Sulfur dioxide, preparation  
(in noncatalytic manuf. of sulfuric acid, from oxygen and sulfur)  
IT 7782-44-7, Oxygen, reactions  
(reaction of, with sulfur, in noncatalytic manuf. of sulfuric acid)

L51 ANSWER 13 OF 40 HCA COPYRIGHT 2005 ACS on STN  
115:186291 Sulfur recovery process for ammonia-containing feed gas.  
Szekely, Andrew Geza (Union Carbide Industrial Gases Technology Corp., USA). Eur. Pat. Appl. EP 440141 A2 19910807, 9 pp.  
DESIGNATED STATES: R: BE, DE, ES, FR, IT. (English). CODEN: EPXXDW. APPLICATION: EP 1991-101086 19910128. PRIORITY: US 1990-471973 19900129.

AB NH3-contg. sour gas is combusted at high flame temp. with .gtoreq.90%-purity O in an externally cooled combustor, the NH3-free product is cooled, then, in conjunction with addnl. acid gas which does not contain NH3, is passed to a Claus furnace wherein <1/3 of the H2S is combusted with O enriched air enabling boosting S recovery in a Claus plant without detrimental effects on catalyst service life, furnace refractories and pressure drops.  
IT 7446-09-5P, Sulfur dioxide, reactions  
(reaction of, with hydrogen sulfide, for sulfur recovery from ammonia-contg. feed gas in Claus plant)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
CC 49-1 (Industrial Inorganic Chemicals)  
IT 7446-09-5P, Sulfur dioxide, reactions  
(reaction of, with hydrogen sulfide, for sulfur recovery from

ammonia-contg. feed gas in Claus plant)  
 IT 7783-06-4P, Hydrogen sulfide, reactions  
 (reaction of, with **sulfur dioxide**, for sulfur  
 recovery from ammonia-contg. feed gas in Claus plant)

L51 ANSWER 14 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 112:222610 Sulfur recovery using metal oxide absorbent, e.g., zinc  
 oxide, with improved purge for treating Claus tail gas.  
 Pendergraft, Paul T. (Amoco Corp., USA). U.S. US 4871521 A  
 19891003, 14 pp. Cont. of U.S. Ser. No. 98,775, abandoned.  
 (English). CODEN: USXXAM. APPLICATION: US 1988-218526 19880706.  
 PRIORITY: US 1986-902248 19860828; US 1987-98775 19870918.

AB S species, esp. H<sub>2</sub>S, are removed from Claus plant tail gases by  
 contact with ZnO to form ZnS. The ZnS is regenerated with dil. O<sub>2</sub>  
 and SO<sub>2</sub> is **recovered**. The treated gas contains  
 .1toreq.250 ppm of total residual H<sub>2</sub>S and SO<sub>2</sub>. To maintain high  
 removals, freshly regenerated ZnO is purged with an effective  
 reducing gas stream, producing SO<sub>2</sub> emissions which are treated  
 downstream in a second ZnO absorber to remove the SO<sub>2</sub>.

IT 7446-09-5P, **Sulfur dioxide**, preparation  
 (recovery of, from zinc sulfide produced by hydrogen  
 sulfide removal from Claus waste gases by zinc oxide, zinc oxide  
 regeneration in)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, Oxygen, uses and miscellaneous  
 (zinc oxide regeneration with, in removal of hydrogen sulfide  
 from Claus plant waste gases)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM C01B017-16  
 ICS C01B031-20; C01B017-02

INCL 423230000

CC 59-4 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 49

IT Waste gases  
 (from Claus plant, hydrogen sulfide removal from, with zinc  
 oxide, **sulfur dioxide recovery** in)

IT 7446-09-5P, **Sulfur dioxide**, preparation  
 (recovery of, from zinc sulfide produced by hydrogen

sulfide removal from Claus waste gases by zinc oxide, zinc oxide regeneration in)

IT 1314-13-2P, Zinc oxide, uses and miscellaneous  
(removal of hydrogen sulfide from Claus plant waste gases with,  
**sulfur dioxide recovery** and zinc  
oxide regeneration in)

IT 7783-06-4, Hydrogen sulfide, uses and miscellaneous  
(removal of, from Claus plant waste gases with zinc oxide,  
**recovery of sulfur dioxide** and  
**regeneration** of zinc oxide in)

IT 1314-98-3, Zinc sulfide, uses and miscellaneous  
(zinc oxide and **sulfur dioxide**  
**recovery** from, in removal of hydrogen sulfide from Claus  
waste gases by zinc oxide)

IT **7782-44-7**, Oxygen, uses and miscellaneous  
(zinc oxide regeneration with, in removal of hydrogen sulfide  
from Claus plant waste gases)

L51 ANSWER 15 OF 40 HCA COPYRIGHT 2005 ACS on STN

112:219870 Sulfur recovery from sodium sulfate-containing wastes.

Meyer, Hermann; Pforr, Gerhard; Roemer, Rainer (BASF A.-G.,  
Germany). Ger. Offen. DE 3829826 A1 **19900315**, 3 pp.  
(German). CODEN: GWXXBX. APPLICATION: DE 1988-3829826 19880902.

AB Wastes and wastewaters contg. Na<sub>2</sub>SO<sub>4</sub> are reduced in the presence of O<sub>2</sub> or air at >1200.degree. to form gaseous S<sub>2</sub>- and SO<sub>x</sub>, as well as an alkali slag, using a coal dust, heavy fuel oil, natural gas, or H<sub>2</sub> furnace. The gaseous reaction products are then processed to S, SO<sub>2</sub>, and H<sub>2</sub>SO<sub>4</sub>. Silicate additives may be used to improve the flow characteristics of the slag, which is then easily removed from the furnace, quenched in water, and used as a silicate building material.

IT **7782-44-7**, Oxygen, uses and miscellaneous  
(in sulfur recovery from sodium sulfate-contg. wastes)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O==O

IT **7446-09-5P**, **Sulfur dioxide**, preparation  
(**recovery** of, from sodium sulfate-contg. wastes by  
redn.)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O==S==O

IC ICM C01B017-00  
 ICS C01B017-48; C04B018-04; C04B014-04  
 ICA B01D053-34  
 CC 49-1 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 58, 60  
 IT 7782-44-7, Oxygen, uses and miscellaneous  
 (in sulfur recovery from sodium sulfate-contg. wastes)  
 IT 7446-09-5P, Sulfur dioxide, preparation  
 7664-93-9P, Sulfuric acid, preparation 7704-34-9P, Sulfur,  
 preparation 12624-32-7P, Sulfur oxide  
 (recovery of, from sodium sulfate-contg. wastes by  
 redn.)

L51 ANSWER 16 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 111:217419 Copper smelting by use of calcium ferrite slag and recycling  
 of high strength sulfur dioxide exhaust gas. Yazawa, A.; Acuna, C.  
 (Res. Inst. Miner. Dress. Metall., Tohoku Univ., Sendai, 980,  
 Japan). Copper 87 [Eighty-Seven], Meeting Date 1987, Volume 4,  
 305-17. Editor(s): Diaz, Carlos; Landolt, Carlos; Luraschi, Antonio  
 A. Univ. Chile, Fac. Cienc. Fis. Mat.: Santiago, Chile. (English)  
 1988. CODEN: 560WA5.

AB The direct prodn. of white metal by smelting with Ca ferrite slag  
 and **pure** O with recycling of high-strength SO<sub>2</sub>  
 exhaust gas was proposed on the basis of heat and material balances  
 and the exptl. data. In comparison to traditional smelting, this  
 process eliminates the requirement of fuel and reduces the amt. of  
 outlet gas and the heat losses considerably. These aspects result  
 in small and tight heat recovery and gas cleaning units. The  
 exhaust gas contains nearly pure SO<sub>2</sub>. CaSO<sub>3</sub>.0.5H<sub>2</sub>O is produced from  
 gas cleaning system and used as flux.  
 IT 7446-09-5P, Sulfur dioxide, preparation  
 (from copper smelting to white metal with calcium ferrite slag,  
 utilization of)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 54-2 (Extractive Metallurgy)  
 IT 7446-09-5P, Sulfur dioxide, preparation  
 (from copper smelting to white metal with calcium ferrite slag,  
 utilization of)

L51 ANSWER 17 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 110:41376 Modified Claus process for sulfur recovery from oil refinery  
 waste gases. Watson, Richard William (BOC Group PLC, UK). Eur.  
 Pat. Appl. EP 290286 A2 19881109, 8 pp. DESIGNATED

STATES: R: AT, BE, DE, FR, IT, NL, SE. (English). CODEN: EPXXDW.  
 APPLICATION: EP 1988-304147 19880506. PRIORITY: GB 1987-10828  
 19870507.

AB In the title process, a 1st H<sub>2</sub>S-contg. waste gas stream [e.g., sour water stripper (SWS) gas] is combusted in a 1st combustion chamber (FCC) using **pure O**; the combustion products are cooled in a heat exchanger, and a part of the product is recycled to the FCC to moderate the temp. The rest of the combustion product is mixed with a 2nd H<sub>2</sub>S-contg. gas stream (e.g., a mixt. of SWS gas and "amine" gas) of different compn. from the 1st. A part of the H<sub>2</sub>S in the mixed gas stream is combusted using **pure O**, and the resulting SO<sub>2</sub> reacts with residual H<sub>2</sub>S to give S and H<sub>2</sub>O. The process minimizes the vol. of "ballast" gas, e.g., N, which flows through the S recovery process. The process is described in detail with flow diagrams.

IT 7446-09-5P, Sulfur dioxide, preparation  
 (formation and reaction of, in sulfur recovery from waste gas by modified Claus process)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

IC ICM C01B017-04  
 CC 49-1 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 51, 59  
 IT 7446-09-5P, Sulfur dioxide, preparation  
 (formation and reaction of, in sulfur recovery from waste gas by modified Claus process)

L51 ANSWER 18 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 108:8279 Method and apparatus for **recovery of a sulfur dioxide**-containing gas mixture from a sulfate-containing waste material. Watson, Richard William (BOC Group PLC, UK). Eur. Pat. Appl. EP 244206 A2 19871104, 7 pp. DESIGNATED  
 STATES: R: BE, DE, ES, FR, IT, NL. (English). CODEN: EPXXDW.  
 APPLICATION: EP 1987-303760 19870428. PRIORITY: GB 1986-10856  
 19860502.

AB Gas mixts. including SO<sub>2</sub> are **recovered** from sulfate waste materials by burning a fuel to form a flame zone, introducing the waste into the flame zone, employing an O-rich gas, e.g., either O-rich air or **pure O**, to support combustion of the fuel and generate a flame of sufficient temp., 900-1300.degree., to thermally crack solid sulfate wastes and liberate SO<sub>2</sub> therefrom, and sepg. the solids exiting the flame zone from the gaseous combustion products. The sulfate waste is preconcd. by evapg. part of the water content. The burner is

disposed vertically or at an angle from the vertical, causing the solid cracking residues to drop by gravity. The collected residues are sent to a zone apart from the flame zone for addnl. thermal cracking. The SO<sub>2</sub> is converted to SO<sub>3</sub> which is absorbed in an aq. liq. to form H<sub>2</sub>SO<sub>4</sub>. The app. is equipped with means to perform all the processes described above.

IT 7446-09-5, Sulfur dioxide, reactions  
 (oxidn. of, from sulfate waste cracking, to trioxide for sulfuric acid manuf.)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-58  
 CC 49-2 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 60  
 ST sulfur dioxide recovery sulfate waste  
 IT 7446-09-5, Sulfur dioxide, reactions  
 (oxidn. of, from sulfate waste cracking, to trioxide for sulfuric acid manuf.)

L51 ANSWER 19 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 107:222346 Sulfur dioxide emissions from oil refineries and combustion of oil products in western Europe. De Meulemeester, A.; De Roocker, A.; Long, M.; Origoni, G. (CONCAWE, The Hague, Neth.). Report, CONCAWE-10/86; Order No. PB87-176921/GAR, 17 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1987, 87(15), Abstr. No. 732,729 (English) 1986.

AB The survey for 1985 of the amt. of S received by refineries and its subsequent disposition, taken together with the earlier 1979 and 1982 surveys, illustrates the ongoing decrease in the oil industry's contribution to the S emission burden on the European environment. The data was extrapolated to compile an overall S mass balance for Western Europe. Input with crude oil and other feedstocks was evaluated against the refinery outputs through the S contents of oil products, the level of S recovery, and SO<sub>2</sub> emissions from refinery stacks. From 1979-1985 the S content of oil products for combustion fell by 62% and S emitted from refinery stacks decreased by 40%. The refinery contribution to total man-made SO<sub>2</sub> emissions continued to decrease and in 1985 it was 6.5%.

IT 7446-09-5P, Sulfur dioxide, biological studies  
 (air pollution by, from petroleum refining and combustion of petroleum products, in western Europe)

RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT **7782-44-7**

(combustion, of petroleum products, sulfur dioxide air pollution in relation to, of western Europe)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT **7446-09-5**

(petroleum refining, sulfur dioxide air pollution by in western Europe)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-2 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 51

IT **7446-09-5P**, Sulfur dioxide, biological studies

(air pollution by, from petroleum refining and combustion of petroleum products, in western Europe)

IT **7782-44-7**

(combustion, of petroleum products, sulfur dioxide air pollution in relation to, of western Europe)

IT **7446-09-5**

(petroleum refining, sulfur dioxide air pollution by in western Europe)

L51 ANSWER 20 OF 40 HCA COPYRIGHT 2005 ACS on STN

107:219900 Modified Claus process for sulfur recovery from hydrogen sulfide-containing gas streams. Watson, Richard William (BOC Group PLC, UK). Eur. Pat. Appl. EP 237217 A1 19870916, 11 pp.

DESIGNATED STATES: R: AT, BE, DE, FR, IT, NL, SE. (English).

CODEN: EPXXDW. APPLICATION: EP 1987-301517 19870220. PRIORITY: GB 1986-5650 19860307; GB 1987-2134 19870130.

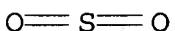
AB A feed gas stream contg. .gtoreq.60 vol% H<sub>2</sub>S (I) is burnt, using (preferably pure) O<sub>2</sub> in a 1st combustion region (CR) to give water vapor and SO<sub>2</sub> (II). Reaction then takes place in a thermal reaction region (TRR) between I and II to give S(g) and water vapor; the resulting gas mixt. is cooled and the S is extd. in a condenser. The mixt. then passes into a 2nd CR where further I is burnt with O<sub>2</sub> to give II and the I:II mol ratio is adjusted to

.apprx.2:1. Further reaction between I and II may be carried out in a TRR and in catalytic reactors with further S extn. in condensers. The mol ratio I:O entering the 2nd CR per unit time is >2:1 and the mol ratio the I to fluids other than O (if any) is >3:2, preferably >4:1. By using substantially **pure** O to support I combustion, a relatively large flow rate of feed-gas mixt. may be handled in a given plant.

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and reaction of, in improved Claus process for hydrogen sulfide removal from gas streams)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC ICM C01B017-04  
ICS B01D053-34

CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 59

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and reaction of, in improved Claus process for hydrogen sulfide removal from gas streams)

L51 ANSWER 21 OF 40 HCA COPYRIGHT 2005 ACS on STN  
107:219899 Modified Claus process for sulfur recovery from hydrogen sulfide-containing gas stream. Watson, Richard William (BOC Group PLC, UK). Eur. Pat. Appl. EP 237216 A1 19870916, 12 pp.  
DESIGNATED STATES: R: AT, BE, DE, FR, IT, NL, SE. (English).  
CODEN: EPXXDW. APPLICATION: EP 1987-301516 19870220. PRIORITY: GB 1986-5649 19860307; GB 1987-2132 19870130.

AB A gas stream contg. (typically) .gtoreq.70 vol.% H<sub>2</sub>S (I) is divided into minor and major streams. The minor stream is burnt in a 1st combustion region (CR) to give SO<sub>2</sub> (II) and water vapor; the resulting gas mixt. is cooled and used in a 2nd CR where a portion of the I in the major stream is burnt. Reaction between the II and the remaining I takes place in a thermal reaction region to give S(g) and water vapor. The proportions of S burnt in the resp. CR's are chosen so that .apprx.1/3 of the total I content of the feed gas is converted to II in these regions. Subsequent reaction between I and II takes place in catalytic reaction regions with S(g) being extd. in condensers. By using substantially **pure** O to support combustion in the 2nd CR, a relatively large flow rate of feed gas may be handled in a given plant.

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and reaction of, in hydrogen sulfide removal from gas streams, modified Claus process for)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
ICS B01D053-34

CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 59

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and reaction of, in hydrogen sulfide removal from gas streams, modified Claus process for)

L51 ANSWER 22 OF 40 HCA COPYRIGHT 2005 ACS on STN

106:122373 Treatment of gases. Watson, Richard William (BOC Group PLC, UK). Brit. UK Pat. Appl. GB 2173780 A1 19861022, 10 pp.  
(English). CODEN: BAXXDU. APPLICATION: GB 1986-57 19860409.  
PRIORITY: GB 1985-9393 19850412.

AB S is manufd. from gas streams contg. .gtoreq.50 vol.% H<sub>2</sub>S by burning a 1st portion of H<sub>2</sub>S with gas contg. .gtoreq.22 vol.% O to form SO<sub>2</sub> and H<sub>2</sub>O, treating a 2nd portion of the H<sub>2</sub>S with the SO<sub>2</sub>, and controlling the reaction temp. by atomization of a noncombustible, vaporizable, e.g., water(l) or CO<sub>2</sub>(l), and/or a vaporized quenchant, e.g., a vapor contg. .gtoreq.80% steam, and condensing the resulting S. The O-contg. gas may be O-enriched gas or **pure** O. Alternatively, the hot, e.g., 1100-1250.degree., reaction gases may be cooled in a heat exchanger or waste heat boiler before S is condensed. After S condensation, the gas mixt. is subjected to .gtoreq.1 catalytic reaction for removal of residual H<sub>2</sub>S by the Claus reaction. After the 1st catalytic reaction the gas mixt. contains H<sub>2</sub>O(g) >80 and S-contg. gases >5 vol.%. The tail gas is treated to remove H<sub>2</sub>S and/or mixed with fuel gas for combustion.

IT 7446-09-5P, Sulfur dioxide, reactions  
(reaction of, with hydrogen sulfide, in sulfur manuf. by Claus reaction)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C01B017-04  
ICS B01D053-34

CC 49-1 (Industrial Inorganic Chemicals)

IT 7446-09-5P, Sulfur dioxide, reactions  
(reaction of, with hydrogen sulfide, in sulfur manuf. by Claus reaction)

L51 ANSWER 23 OF 40 HCA COPYRIGHT 2005 ACS on STN

106:104695 Method and catalytic reactor for conversion of hydrogen sulfide to sulfur. Heisel, Michael; Lohmueller, Reiner; Marold, Freimut (Linde A.-G., Fed. Rep. Ger.). Ger. Offen. DE 3526706 A1 19870129, 7 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1985-3526706 19850725.

AB The catalytic conversion of H<sub>2</sub>S to S in gas streams is carried out by directing the preheated gas over an internally cooled, quasi-isothermal catalyst bed. The catalytic reactor contains .gtoreq.1 cooling devices.

IT 7782-44-7, Oxygen, reactions  
(combustion of hydrogen sulfide by, in sulfur recovery from hydrogen sulfide-contg. gases)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O—O

(combustion, of residual sulfur compds., to **sulfur dioxide**, in sulfur **recovery** from hydrogen sulfide-contg. gases

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and recycling of, in sulfur recovery from hydrogen sulfide-contg. gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

IC ICM C01B017-04

CC 49-1 (Industrial Inorganic Chemicals)

Section cross-reference(s): 47

IT Combustion  
(of residual sulfur compds., to **sulfur dioxide**, in sulfur **recovery** from hydrogen sulfide-contg. gases)

IT 7782-44-7, Oxygen, reactions  
(combustion of hydrogen sulfide by, in sulfur recovery from hydrogen sulfide-contg. gases)

IT 7782-44-7  
(combustion, of residual sulfur compds., to **sulfur dioxide**, in sulfur **recovery** from hydrogen sulfide-contg. gases)

IT 7446-09-5P, Sulfur dioxide, preparation  
(formation and recycling of, in sulfur recovery from hydrogen sulfide-contg. gases)

L51 ANSWER 24 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 106:88191 Converting matte in two converters. Leiponen, Matti Olavi  
 (Outokumpu Oy, Finland). Pat. Specif. (Aust.) AU 553412 B2  
 19860717, 16 pp. (English). CODEN: ALXXAP. APPLICATION:  
 AU 1982-90888 19821125.

AB Alternated blowing is applied in 2 converters for matte conversion treatment with a uniform gas flow, higher heating efficiency, and increased smelting capacity. Blowing of one converter is applied while the other one is charged with a high-grade matte from a flash-smelting furnace, or tilted for discharge of slag and crude metal (esp. Cu) products. Waste gas contg. SO<sub>2</sub> from the converters is fed to H<sub>2</sub>SO<sub>4</sub>-manufd. plant at a uniform rate. A single waste-heat boiler is used with both converters.

IT 7782-44-7, Oxygen, uses and miscellaneous  
 (converter blowing with gas contg., for matte smelting)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O==O

IT 7446-09-5P, Sulfur dioxide, preparation  
 (recovery of, in converter matte smelting blowing control of)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O==S==O

IC C01B017-74; C21C005-42; C22B015-06

CC 54-2 (Extractive Metallurgy)

Section cross-reference(s): 51

IT 7782-44-7, Oxygen, uses and miscellaneous  
 (converter blowing with gas contg., for matte smelting)

IT 7446-09-5P, Sulfur dioxide, preparation  
 (recovery of, in converter matte smelting blowing control of)

L51 ANSWER 25 OF 40 HCA COPYRIGHT 2005 ACS on STN

103:107515 Sulfur recovery in regeneration of iron desulfurization catalysts. (Central Research Laboratories for the Electric Power Foundation, Japan). Jpn. Kokai Tokkyo Koho JP 60060190 A2  
 19850406 Showa, 3 pp. (Japanese). CODEN: JKXXAF.

APPLICATION: JP 1983-167943 19830912.

AB S is recovered in regeneration of Fe oxide coal gas desulfurization catalysts by sustaining the formation of sulfurous acid anhydride in

addn. of small amt. of O or air. Thus, 12.4 g S-contaminated Fe catalyst was contacted with 163 g/h steam (550.degree.) contg. 0.2% O and .apprx.30% of total S was recovered in 120 min as solid phase.

IT 7446-09-5P, preparation  
(formation of, prevention of, by addn. of oxygen, in sulfur recovery in regeneration of iron catalysts)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O==S==O

IT 7782-44-7, uses and miscellaneous  
(in prevention of **sulfur dioxide** formation,  
in **recovery** of sulfur, in regeneration of iron catalyst)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O==O

IC ICM C10K001-26  
CC 51-20 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 49

IT 7446-09-5P, preparation  
(formation of, prevention of, by addn. of oxygen, in sulfur recovery in regeneration of iron catalysts)

IT 7782-44-7, uses and miscellaneous  
(in prevention of **sulfur dioxide** formation,  
in **recovery** of sulfur, in regeneration of iron catalyst)

L51 ANSWER 26 OF 40 HCA COPYRIGHT 2005 ACS on STN

103:24454 Antimony sesquioxide production. Zellner, Robert J.  
(McGean-Rohco, Inc., USA). U.S. US 4515765 A 19850507, 4  
pp. (English). CODEN: USXXAM. APPLICATION: US 1983-564926  
19831223.

AB Sb<sub>2</sub>O<sub>3</sub> is manufd. by burning powd. Sb<sub>2</sub>S<sub>3</sub> in **pure O<sub>2</sub>**. The combustion products, Sb<sub>2</sub>O<sub>3</sub> and SO<sub>2</sub> are quenched to below the b.p. of Sb<sub>2</sub>O<sub>3</sub> to condense the Sb<sub>2</sub>O<sub>3</sub> which is sepd. from the SO<sub>2</sub>. The SO<sub>2</sub> is cooled and liquefied. A device is described for **recycling** the cooled SO<sub>2</sub> for cooling the SO<sub>2</sub> plus Sb<sub>2</sub>O<sub>3</sub> combustion products.

IT 7446-09-5P, preparation  
(manuf. of, antimony sulfide combustion with **pure oxygen** in)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC C01B027-00

INCL 423617000

CC 49-10 (Industrial Inorganic Chemicals)

IT 1309-64-4P, preparation 7446-09-5P, preparation  
(manuf. of, antimony sulfide combustion with pure  
oxygen in)

L51 ANSWER 27 OF 40 HCA COPYRIGHT 2005 ACS on STN

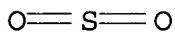
100:148362 Photochemistry of argon matrixes containing nitric oxide and carbonyl sulfide. 1. The photolysis of the nitric oxide dimer, cis-N<sub>2</sub>O<sub>2</sub>. Hawkins, Michael; Downs, Anthony J. (Inorg. Chem. Lab., Univ. Oxford, Oxford, OX1 3QR, UK). Journal of Physical Chemistry, 88(8), 1527-33 (English) 1984. CODEN: JPCHAX. ISSN: 0022-3654.

AB Irradn. at .lambda. = 220-320 nm causes the cis isomer of the NO dimer isolated in an Ar matrix at 13-20 K to photodissoc. to N<sub>2</sub>O and O atoms. The photochem. behavior is interpreted in terms of the structure and bonding of cis-[NO]<sub>2</sub> and comparisons are made with predictions based on ab initio CI and CNDO/S calcns. The O atoms are obsd. to react with CO, OCS, NO, and cis-[NO]<sub>2</sub> under these conditions and there is evidence for 2 conformers of the product sym-N<sub>2</sub>O<sub>3</sub>. Concurrent photolysis of OCS in Ar/OCS/NO matrixes leads to products characteristic of S atom transfer including SO<sub>2</sub> and regenerated OCS. The use of isotropic enrichment to identify products yielded direct evidence in support of the cage-recombination mechanism for the matrix reaction of S atoms with O<sub>2</sub>.

IT 7446-09-5P, preparation  
(formation of, in photolysis of argon matrix contg. nitric oxide and carbonyl sulfide)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IT 7782-44-7, reactions

(photolysis of, in argon matrix contg. carbonyl sulfide and)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)



CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 IT 7446-09-5P, preparation 56971-19-8P  
     (formation of, in photolysis of argon matrix contg. nitric oxide and carbonyl sulfide)  
 IT 7782-44-7, reactions 32767-18-3, reactions  
     (photolysis of, in argon matrix contg. carbonyl sulfide and)

L51 ANSWER 28 OF 40. HCA COPYRIGHT 2005 ACS on STN  
 97:96012 Oxygen smelting of copper concentrate with exhaust  
     **sulfur dioxide gas recycling**. Yazawa,  
     Akira; Tozawa, Kazuteru (Res. Inst. Miner. Dress. Metall., Tohoku  
     Univ., Sendai, Japan). Journal of Metals, 34(3), 39-44 (English)  
 1982. CODEN: JOMTAA. ISSN: 0022-2674.

AB The use of O in Cu smelting decreases dust and heat loss by reducing the quantity of exhaust gas. An O-smelting process (Senken) with exhaust SO<sub>2</sub> **recycling**, produces >60% Cu matte and the amts. of heat and gas are 62 and 28%, resp., of those of a conventional process. The furnace shaft is low, and mixed O-SO<sub>2</sub> are introduced after preheating to 800 K. A small vol. of high-SO<sub>2</sub> exhaust gas is produced which is treated by use of a waste heat boiler. Cu concns. with a CuFeS<sub>2</sub> compn. are smelted by 50% O-SO<sub>2</sub> gas to produce 67% Cu matte, which is converted continuously with the 50/50 O-SO<sub>2</sub> gas.

IT 7782-44-7, uses and miscellaneous  
     (in smelting of copper, **sulfur dioxide recycling** in relation to)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5P, preparation  
     (**recycling** of, in oxygen smelting of copper concs.)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 54-2 (Extractive Metallurgy)  
 IT 7782-44-7, uses and miscellaneous  
     (in smelting of copper, **sulfur dioxide recycling** in relation to)  
 IT 7440-50-8P, preparation  
     (recovery of, by smelting in shaft furnace, **sulfur**

dioxide recycling in)

IT 7446-09-5P, preparation  
(recycling of, in oxygen smelting of copper concs.)

L51 ANSWER 29 OF 40 HCA COPYRIGHT 2005 ACS on STN

95:64515 Method of producing sulfuric acid. Mukhlenov, I. P.; Soroko, V. E.; Vasiliev, B. T.; Bartov, A. T.; Borisov, V. M.; Vorotnikov, A. G.; Egorov, P. A.; Ilgisonis, I. V.; Kuzichkin, N. V.; et al. (Leningrad Technological Institute, USSR; Scientific-Research Institute of Fertilizers and Insectofungicides). Brit. GB 1585869 19810311, 7 pp. (English). CODEN: BRXXAA. APPLICATION: GB 1977-46082 19771104.

AB H<sub>2</sub>SO<sub>4</sub> is manufd. by catalytically oxidizing SO<sub>2</sub> in a fluidized bed, withdrawing heat from the bed using a heat exchanger, converting the SO<sub>3</sub> from the product gas mixt. into H<sub>2</sub>SO<sub>4</sub>, and returning part of the gas mixt. contg. unreacted SO<sub>2</sub>, excess O, and inert gas to the oxidn. stage via an injector. A gas mixt. contg. SO<sub>2</sub> is supplied to the injector from an app. for converting S or S-contg. material into SO<sub>2</sub>, under a pressure higher than that in the circulation system (5-12 atm). The excess O at the entry to the circulation system relative to the stoichiometric amt. necessary for SO<sub>2</sub> oxidn. is .1 to req. 1.5%. Preferably, the SO<sub>2</sub> is obtained by bubbling O through molten S at 120-150.degree. and oxidizing the S vapor at 2-35 atm in a fluidized bed of inert material or wear-resistant catalyst. Thus, a mixt. contg. SO<sub>2</sub> 65.5, O 34.0, and inert gases 0.5 vol. % was delivered at 15 atm and 650.degree. into an injector where it was mixed with circulating gas to give a compn. contg. SO<sub>3</sub> 0.04, SO<sub>2</sub> 49.2, O 37.94, and N 12.82 vol. %. The mixt. was fed at 10 atm into a fluidized bed of V<sub>2</sub>O<sub>5</sub> catalyst for oxidn. at 450-550.degree.. The product gases were fed into app. where SO<sub>3</sub> was absorbed in H<sub>2</sub>SO<sub>4</sub> at 70-250.degree. to give a gas mixt. contg. SO<sub>3</sub> 0.14, SO<sub>2</sub> 14.89, O 46.17, and inert gas 38.8 vol. %, 681 kg/h of which was withdrawn and the remainder recycled. The excess heat was used to generate steam at 440.degree. and 40 atm. The process yielded 2364 tons H<sub>2</sub>SO<sub>4</sub>/day at 99.7% SO<sub>2</sub> conversion.

IT 7446-09-5P, reactions  
(prepn. and oxidn. of, in sulfuric acid manuf.)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC C01B017-77

CC 49-2 (Industrial Inorganic Chemicals)

ST sulfuric acid manuf; **sulfur dioxide** oxidn  
 sulfuric acid  
 IT Oxidation  
 (of **sulfur dioxide**, in sulfuric acid manuf.,  
 gas recycling in)  
 IT 7664-93-9P, preparation.  
 (manuf. of, by fluidized-bed oxidn. of **sulfur dioxide**, gas recycling in)  
 IT 7446-09-5P, reactions  
 (prepn. and oxidn. of, in sulfuric acid manuf.)

L51 ANSWER 30 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 94:213461 Decreasing sulfur dioxide emissions from Inco Metals Company's Copper Cliff smelter. Warner, J. Stuart (Occup. Health Enviro. Inco Ltd., ON, Can.). Proceedings of the Ontario Industrial Waste Conference, 27th, 138-53 (English) 1980. CODEN: OIWPAR.  
 ISSN: 0078-4893.

AB SO<sub>2</sub> pollution control at the title Cu and Ni smelter is described, including (1) magnetic sepn. of pyrrhotite from the ore and thus removal of it from the Ni conc.; (2) roasting the sepd. pyrrhotite in the Fe ore recovery plant and feeding the gas therefrom, contg. .apprx.10% SO<sub>2</sub>, to H<sub>2</sub>SO<sub>4</sub> plants; (3) combusting Cu conc. with **pure O**, to give an off-gas contg. 75-80% SO<sub>2</sub>, which is cleaned and liquefied to give .apprx.100,000 tons liq. SO<sub>2</sub>/yr; (4) building of tall chimneys and adjusting smelter output in relation to meteorol. conditions.

IT 7446-09-5, biological studies  
 (air pollution by, by smelter at Copper Cliff, Ontario, control of)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

CC 59-2 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 49, 54  
 ST sulfur dioxide control copper smelter; magnetic sepn pyrrhotite copper smelter; pyrrhotite roasting **sulfur dioxide recovery**; chimney height sulfur dioxide dispersion  
 IT 7446-09-5, biological studies  
 (air pollution by, by smelter at Copper Cliff, Ontario, control of)

L51 ANSWER 31 OF 40 HCA COPYRIGHT 2005 ACS on STN

94:194351 Method and apparatus for decomposing a gas mixture containing mainly sulfur dioxide and a lower boiling component. Lang, Udo; Kick, Helmut; Schmid, Wolfgang (Linde A.-G., Fed. Rep. Ger.). Ger.

Offen. DE 2930522 19810219, 16 pp. (German). CODEN:  
GWXXBX. APPLICATION: DE 1979-2930522 19790727.

AB Gas mixts., esp. those from cyclic thermochem. H manufg. plants, contg. mainly SO<sub>2</sub> as well as O or N and H<sub>2</sub>O vapor are cooled in a multiple-stage process with condensation of SO<sub>2</sub> and H<sub>2</sub>O, followed by scrubbing the gas from the last stage in a column to recover the remaining SO<sub>2</sub>. The wash liquor from the scrubbed is stripped in another column at increased pressure and with recirculation of the bottom liquor to the scrubber. The sepn. is good, the condensed components are recycled, and energy is recovered by O expansion.

IT 7446-09-5P, preparation  
(sepn. of, from oxygen, in cyclic thermochem. process for hydrogen manuf.)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7P, preparation  
(sepn. of, from sulfur dioxide, in cyclic thermochem. manuf. of hydrogen from water)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC C01B017-56  
CC 49-1 (Industrial Inorganic Chemicals)  
IT 7446-09-5P, preparation  
(sepn. of, from oxygen, in cyclic thermochem. process for hydrogen manuf.)  
IT 7782-44-7P, preparation  
(sepn. of, from sulfur dioxide, in cyclic thermochem. manuf. of hydrogen from water)

L51 ANSWER 32 OF 40 HCA COPYRIGHT 2005 ACS on STN  
93:116630 Oxygen recovery from gas mixtures. Norman, John H. (General Atomic Co., USA). U.S. US 4208396 19800617, 5 pp.  
Cont.-in-part of U.S. 4,089,940. (English). CODEN: USXXAM.  
APPLICATION: US 1977-865950 19771230.

AB The O<sub>2</sub> in a mixt. with another gas is recovered by chem. oxidizing to a nongaseous product with a nongaseous oxidant without reacting the O<sub>2</sub>. The process is esp. useful for removing SO<sub>2</sub> from an O<sub>2</sub>-SO<sub>2</sub> mixt. such as occurs in the cyclic thermochem. manuf. of H<sub>2</sub> and O<sub>2</sub> from H<sub>2</sub>O based on the reaction of H<sub>2</sub>O, SO<sub>2</sub>, and I<sub>2</sub>. The O<sub>2</sub>-SO<sub>2</sub>

mixt. is injected into the bottom of a reactor contg. H<sub>2</sub>O and I<sub>2</sub> at a rate sufficiently slow that all SO<sub>2</sub> is oxidized by the I<sub>2</sub> and the substantially **pure O<sub>2</sub>** leaves at the top.

IT 7446-09-5, reactions  
 (oxidn. of, by iodine, for sepn. from oxygen)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC C01B013-00  
 INCL 423579000  
 CC 49-1 (Industrial Inorganic Chemicals)  
 IT 7553-56-2, reactions  
 (oxidn. by, of **sulfur dioxide** for oxygen recovery)  
 IT 7446-09-5, reactions  
 (oxidn. of, by iodine, for sepn. from oxygen)

L51 ANSWER 33 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 92:11596 Quantum yield of oxygen photoadsorption on zinc sulfide, copper-doped zinc sulfide, and silver-doped zinc sulfide. Gorodina, T. A.; Minakova, T. S. (USSR). Tezisy Dokl. Vses. Soveshch. "Tekhnol., Protsessy, Appar. Kach. Prom. Lyuminoforov", 67-9. Vses. Nauchno-Issled. Inst. Lyuminoforov Osobo Chist. Veshchestv: Stavropol, USSR. (Russian) 1977. CODEN: 41VJAN.

AB The spectral dependence of quantum yield of O photoadsorption on **pure** ZnS or ZnS:Cu and ZnS:Ag was studied. The quantum yield increases in the order ZnS < ZnS:Cu < ZnS:Ag. When thermally desorbed in H atm., H<sub>2</sub>O and SO<sub>2</sub> form. The SO<sub>2</sub> concn. is high when desorbed rapidly and it is min. when desorbed at a very slow heating. The much lower quantum yield of O photoadsorption on **pure** ZnS as compared with that on ZnO is explained by the insignificant contribution to the photoadsorption of the discharge of O adsorbed in dark at room temp.

IT 7446-09-5P, preparation  
 (formation of, on rapid desorption of oxygen from zinc sulfide)

RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 66-3 (Surface Chemistry and Colloids)  
 Section cross-reference(s): 73  
 IT Adsorption  
 (photo-, of **oxygen**, on **pure** and doped zinc

sulfide, quantum yield of)

IT 7446-09-5P, preparation  
(formation of, on rapid desorption of oxygen from zinc sulfide)

L51 ANSWER 34 OF 40 HCA COPYRIGHT 2005 ACS on STN

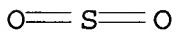
81:5106 **Sulfur dioxide.** Sasaki, Kazuo Jpn. Kokai  
Tokkyo Koho JP 48099094 19731215 Showa, 3 pp. (Japanese).  
CODEN: JKXXAF. APPLICATION: JP 1972-31444 19720329.

AB S or its compds. are burned in a **gas** contg. O,  
H<sub>2</sub>O, and **SO<sub>2</sub>** and cooled to condense H<sub>2</sub>O contg. **SO<sub>2</sub>**  
, a portion of which is recycled. A **gas** contg. O  
40, H<sub>2</sub>O 58.5, and **SO<sub>2</sub>** 1.5% was prep'd. from O, H<sub>2</sub>O, and  
satd. aq. **SO<sub>2</sub>**, and **molten S** was burned  
in it. The gas was cooled to 25.degree. to obtain 100% **SO<sub>2</sub>**  
when dried with H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O contg. 9% **SO<sub>2</sub>**, which was  
reused.

IT 7446-09-5P, preparation  
(from sulfur, by combustion)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



INCL 15B111

CC 49-2 (Industrial Inorganic Chemicals)

ST **sulfur dioxide manuf**

IT 7446-09-5P, preparation  
(from sulfur, by combustion)

L51 ANSWER 35 OF 40 HCA COPYRIGHT 2005 ACS on STN

71:103721 Production of sulfur dioxide, oxygen, and hydrogen. Finfer,  
Edward Z.; Maurer, Michael H. (Chemical Construction Corp.). Ger.  
Offen. DE 1817177 19690814, 18 pp. (German). CODEN:  
GWXXBX. PRIORITY: US 19671226.

AB Concd. SO<sub>2</sub> in liq.. or gas form for industrial use was obtained by  
scrubbing stack gases having low SO<sub>2</sub> content with NaOH and KOH soln.  
(1-5 g./100 ml.), sepg. formed sulfites by cooling as ppt., and  
subsequently decompd. the sulfites by dissolving in H<sub>2</sub>SO<sub>4</sub>-alkali  
sulfate anolyte. By electrolyzing the anolyte in a conventional  
Hg-electrolytic cell O<sub>2</sub> and H<sub>2</sub> were obtained as by-products, while  
alkali hydroxide and H<sub>2</sub>SO<sub>4</sub> were made for the process.

IT 7446-09-5P, preparation 7782-44-7P, preparation  
(recovery of, from flue gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC C01B; F23J  
CC 49 (Industrial Inorganic Chemicals)  
IT 1333-74-0P, preparation 7446-09-5P, preparation  
7664-93-9P, preparation 7782-44-7P, preparation  
(recovery of, from flue gases)

L51 ANSWER 36 OF 40 HCA COPYRIGHT 2005 ACS on STN  
54:70922 Original Reference No. 54:13580i,13581a-b Recovery  
of **sulfur dioxide** from waste gases. Tarbutton,  
Grady; Driskell, John C.; Jones, Thomas M.; Smith, Carter M.  
(Tennessee Valley Authority). US 2926999 19600301  
(Unavailable). APPLICATION: US

AB Gases contg. .ltoreq. 1% **SO<sub>2</sub>**, such as combustion products,  
can be substantially freed from **SO<sub>2</sub>** with a min. vol. of  
scrubbing liquid by adding 20 80 p.p.m. **O<sub>3</sub>** (preferably about 40  
p.p.m.) and scrubbing with an aq. soln. of **H<sub>2</sub>SO<sub>4</sub>** or **(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>** contg.  
0.03-0.3% **Mn**. The gas must contain sufficient **O<sub>2</sub>** to  
convert **SO<sub>2</sub>** to **SO<sub>3</sub>**, and phenolic and **Cu** compds. must be  
absent. The contact time should be 8-36 sec. when liquid is passed  
down over the surfaces of packing in a tower, countercurrent to the  
gas, preferably 12-36 sec. when **H<sub>2</sub>SO<sub>4</sub>** is the product and 8-12 sec.  
when **NH<sub>3</sub>** is added to the tower. When **H<sub>2</sub>SO<sub>4</sub>** is the product, the  
concn. of the acid should not exceed 16-30% in the tower; both the  
**recovery** of **SO<sub>2</sub>** and the efficiency of the **O<sub>3</sub>** are  
higher when more dil. acid is used as the absorption medium. Under  
suitable conditions almost quant. **recovery** of **SO<sub>2</sub>**  
is possible; **recoveries** may be somewhat less with  
**(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>** soln.

IT 7446-09-5, **Sulfur dioxide**  
(recovery of, from waste gases)

RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 18 (Inorganic Industrial Chemicals)  
IT Combustion

(of sulfur (molten) in SO<sub>2</sub>  
manuf.)

IT Wastes  
(sulfur dioxide recovery from  
gaseous)

IT 7446-09-5, Sulfur dioxide  
(recovery of, from waste gases)

L51 ANSWER 37 OF 40 HCA COPYRIGHT 2005 ACS on STN  
52:12991 Original Reference No. 52:2353i,2354a Recovery of  
sulfur dioxide from waste gases and ammonium  
sulfate manufacture. Johnstone, Henry F.; West, Wm. E., Jr. (Texas  
Gulf Sulphur Co.). US 2810627 19571022 (Unavailable).  
APPLICATION: US .

AB SO<sub>2</sub> is recovered from waste gases such as those  
from the combustion of coal by scrubbing with aq. ammoniacal soln.  
to give an effluent contg. (NH<sub>4</sub>)<sub>2</sub>SO<sub>8</sub> and NH<sub>4</sub>HSO<sub>3</sub>, (cf. C.A. 48,  
11018b). The effluent is treated with air or pure  
O<sub>2</sub> to produce (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and SO<sub>2</sub>. The SO<sub>2</sub> is stripped from  
the soln. and the (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> is crystd. from the residual soln.

IT 7446-09-5, Sulfur dioxide  
(recovery of, from flue gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)

IT Flue gases  
(sulfur dioxide recovery from)

IT 7446-09-5, Sulfur dioxide  
(recovery of, from flue gases)

L51 ANSWER 38 OF 40 HCA COPYRIGHT 2005 ACS on STN

45:53946 Original Reference No. 45:9230e-g Canadian sulfur. Zabel,  
Herman W. Chem. Inds., 63, 960 (Unavailable) 1948.

AB Canadian imports of S from the U.S. are being reduced by home  
production of liquid SO<sub>2</sub> from the roasting of pyritic Ni ore in  
pure O<sub>2</sub>; 72% of the SO<sub>2</sub> content of the roasted  
gas, which contains 70% SO<sub>2</sub>, is condensed in a H<sub>2</sub>O-cooled condenser  
at 120 lb./sq. in. The gases obtained by roasting the pyrites in  
air contain only 6% of SO<sub>2</sub> and for a 72% recovery of this gas a  
pressure of 400 lb./sq. in. and a temp. of -70.degree. are needed.  
After drying with 98% H<sub>2</sub>SO<sub>4</sub>, the gas is 99.9% pure and is used in  
paper pulping. At the Noranda smelter, a thick bed of Fe pyrites on  
a traveling hearth is ignited on the tip, and the reaction of the  
high-temp. roasting fire is caused to travel downwards in a thin

band by controlling the air supply, so that half of the S distils as free S from the lower group of the bed and the remaining S is converted into SO<sub>2</sub> for making H<sub>2</sub>SO<sub>4</sub> or for recovery as liquid SO<sub>2</sub>.

IT 7446-09-5, Sulfur dioxide  
(manuf. of, in Canada)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)  
IT 7446-09-5, Sulfur dioxide 7664-93-9, Sulfuric acid  
(manuf. of, in Canada)

L51 ANSWER 39 OF 40 HCA COPYRIGHT 2005 ACS on STN  
31:53152 Original Reference No. 31:7371b-d **Sulfur dioxide recovery** at Trail. A general picture of the development and installation of the sulfur dioxide plants of the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, B. C.. Lepsoe, R.; Kirkpatrick, W. S. Transactions - the Canadian Institute of Mining and Metallurgy and the Mining Society of Nova Scotia, 40, 399-404 From: Can. Mining Met. Bull. No. 304 (Unavailable) 1937. CODEN: TCIMAT. ISSN: 0371-5701.

AB From 50 to 60% of total S in gases is removed as 450 tons H<sub>2</sub>SO<sub>4</sub> and 45 tons S per day. By flash roasting the Zn concentrate an 8% SO<sub>2</sub> gas, suitable for H<sub>2</sub>SO<sub>4</sub> mfg., is obtained. SO<sub>2</sub> is absorbed from lower-grade gases with aq. NH<sub>3</sub> to give (NH<sub>4</sub>)<sub>2</sub>SO<sub>3</sub> or, with continued SO<sub>2</sub> passage, to NH<sub>4</sub>HSO<sub>3</sub>. Gas concn. is reduced to 0.1% SO<sub>2</sub>. The resulting soln. contains 5-6 lb. SO<sub>2</sub> per gal. of soln. SO<sub>2</sub> is recovered by H<sub>2</sub>SO<sub>4</sub> treatment, and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> crystd. for market, or by heating. SO<sub>2</sub> is used for manuf. of S or H<sub>2</sub>SO<sub>4</sub>. SO<sub>2</sub> + pure O<sub>2</sub> is blown into a water-gas producer. The gases leaving the top are CO<sub>2</sub>, S, CO and C oxysulfide. The latter + SO<sub>2</sub> react in a brick tower to form S.

IT 7446-09-5, Sulfur dioxide  
(recovery of, at Trail, B. C.)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 9 (Metallurgy and Metallography)  
IT 7664-93-9, Sulfuric acid  
(manuf. of, from SO<sub>2</sub> recovered in Zn roasting  
at Trail)

IT 7440-66-6, Zinc  
 (metallurgy of, roasting, SO<sub>2</sub> recovery at Trail in)

IT 7446-09-5, Sulfur dioxide  
 (recovery of, at Trail, B. C.)

IT 7704-34-9, Sulfur  
 (recovery of, from SO<sub>2</sub> or SO<sub>2</sub>-contg. gases)

L51 ANSWER 40 OF 40 HCA COPYRIGHT 2005 ACS on STN  
 30:17759 Original Reference No. 30:2334c-d Burning sulfur to produce sulfur dioxide. Bencowitz, Isaac (Texas Gulf Sulphur Co.). US 2031403 19360218 (Unavailable). APPLICATION: US .

AB Molten S and O are introduced , in independently regulable quantities, into a heated combustion chamber, simultaneously agitated to effect intimate admixt., and the mixt. is passed along a tortuous path in the heated combustion chamber to oxidize the S, and the mixt. of gases is subsequently passed through heated checkerwork. App. is described.

IT 7446-09-5, Sulfur dioxide  
 (manuf. of)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)

IT 7446-09-5, Sulfur dioxide  
 (manuf. of)

IT 7446-09-5, Sulfur dioxide  
 (recovery of, from gases)

=> d 152 1-24 cbib abs hitstr hitind

L52 ANSWER 1 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 139:190143 Determination of total sulphur by vacuum combustion extraction - quadrupole mass spectrometry (VCE - QMS). Sayi, Y. S.; Shankaran, P. S.; Yadav, C. S.; Chhapru, G. C.; Ramakumar, K. L.; Venugopal, V. (Fuel Chemistry Division, Bhabha Atomic Research Centre, Mumbai, 400 085, India). Proceedings of the National Academy of Sciences, India, Section A: Physical Sciences, 72(3), 241-248 (English) 2002. CODEN: PAIAA3. ISSN: 0369-8203. Publisher: National Academy of Sciences, India.

AB A vacuum combustion extn. cum quadrupole mass spectrometric (VCE-QMS) technique was developed for the detn. of total sulfur.

The method involves combustion of sample under vacuum in the presence of oxygen generating substance or **pure oxygen** to convert sulfur into sulfur dioxide, extn. of gases into a known vol., measurement of pressure and compn. by differential oil manometer and quadrupole mass spectrometer resp. The concn. is then evaluated from the pressure values. The method is applicable both at trace and major levels of sulfur. The precision of the method is better than 10% and 3% at trace levels and major levels resp.

IT 7704-34-9, Sulfur, analysis  
 (total sulfur detn. by vacuum combustion and quadrupole mass spectrometry)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, analysis  
 (total sulfur detn. by vacuum combustion and quadrupole mass spectrometry)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 79-4 (Inorganic Analytical Chemistry)

IT 7704-34-9, Sulfur, analysis  
 (total sulfur detn. by vacuum combustion and quadrupole mass spectrometry)

IT 7446-09-5, Sulfur dioxide, analysis  
 (total sulfur detn. by vacuum combustion and quadrupole mass spectrometry)

L52 ANSWER 2 OF 24 HCA COPYRIGHT 2005 ACS on STN

139:38918 Desulfurization with improved sorbent regeneration. Gislason, Jason J.; Brown, Ronald E.; Morton, Robert W.; Dodwell, Glenn W. (ConocoPhillips Company, USA). U.S. Pat. Appl. Publ. US 2003114296 A1 20030619, 11 pp. (English). CODEN: USXXCO. APPLICATION: US 2001-25343 20011219.

AB During regeneration of a sulfurized sorbent, the oxygen partial pressure in the regeneration zone is controlled to minimize sulfation of the sorbent.

IT 7446-09-5, Sulfur dioxide, formation (nonpreparative)  
 (desulfurization with improved zinc-based sorbent regeneration)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, Oxygen, reactions  
(desulfurization with improved zinc-based sorbent regeneration)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9, Sulfur, reactions  
(desulfurization with improved zinc-based sorbent regeneration)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM B01J038-12  
INCL 502038000; 423622000  
CC 51-6 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 67  
ST desulfurization sorbent regeneration hydrodesulfurization; gasoline  
zinc oxide sulfide desulfurization sorbent regeneration  
SO<sub>2</sub> content; zinc sorbent promoter metal regeneration oxygen  
oxidn hydrogen redn  
IT 7446-09-5, Sulfur dioxide, formation (nonpreparative)  
(desulfurization with improved zinc-based sorbent regeneration)  
IT 1333-74-0, Hydrogen, reactions 7782-44-7, Oxygen,  
reactions  
(desulfurization with improved zinc-based sorbent regeneration)  
IT 7704-34-9, Sulfur, reactions  
(desulfurization with improved zinc-based sorbent regeneration)

L52 ANSWER 3 OF 24 HCA COPYRIGHT 2005 ACS on STN  
138:291809 Biological treatment of NO<sub>x</sub> and SO<sub>2</sub>. Philip, Ligy;  
Deshusses, Marc A. (Dept. of Civil Engineering, Indian Institute of  
Technology, Madras, 600 036, India). Proceedings of the Air & Waste  
Management Association's Annual Conference & Exhibition, 95th,  
Baltimore, MD, United States, June 23-27, 2002, 3984-3995. Air &  
Waste Management Association: Pittsburgh, Pa. ISBN: 0-923204-45-8  
(English) 2002. CODEN: 69DMAK.

AB Complete treatment of flue gas SO<sub>2</sub> in a 2-stage process consisting  
of a biotrickling filter followed by biol. post-treatment unit was  
examd. The biotrickling filter removed 100% of influent SO<sub>2</sub> from  
simulated flue gas at an empty bed residence time of 6 s at concns.

of 300-1000 ppmv. All absorbed SO<sub>2</sub> was recovered in the biotrickling filter liq. effluent as sulfites (a chem. reaction product of SO<sub>2</sub>) and SO<sub>4</sub><sup>2-</sup> (a product of biol. oxidn. of sulfites). The biotrickling filter liq. effluent was further processed biol. in a post-treatment unit consisting of a combined anaerobic and micro-aerophilic reactor fed glucose as a C source for SO<sub>4</sub><sup>2-</sup> and sulfite redn. The post-treatment unit effectively treated trickling water to produce elemental S. S prodn. efficiency reached apprx.80% of SO<sub>2</sub> treated. This biol. treatment system seems a promising alternative for flue gas desulfurization.

IT 7704-34-9, Sulfur, processes  
(elemental; removing flue gas nitrogen oxides and sulfur dioxide in two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7782-44-7, Oxygen, processes  
(removing flue gas nitrogen oxides and sulfur dioxide in two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5, Sulfur dioxide, processes  
(removing flue gas nitrogen oxides and sulfur dioxide in two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 10, 60, 67

IT 7704-34-9, Sulfur, processes  
(elemental; removing flue gas nitrogen oxides and sulfur dioxide in two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

IT 7782-44-7, Oxygen, processes  
(removing flue gas nitrogen oxides and sulfur dioxide in

two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

IT 7446-09-5, Sulfur dioxide, processes 10102-43-9, Nitric oxide, processes 11104-93-1, Nitrogen oxide, processes (removing flue gas nitrogen oxides and sulfur dioxide in two-stage biotrickling filter and anaerobic/aerophilic bioreactor)

L52 ANSWER 4 OF 24 HCA COPYRIGHT 2005 ACS on STN

137:142825 Coupled electromagnetic and acoustic pulse-based stimulation of petroleum reservoirs with electrohydraulic and electromagnetic discharge. Thomas, Sally A.; Gilbert, William W.; Huffman, Alan Royce (Conoco Inc., USA). U.S. US 6427774 B1 20020806, 23 pp., Cont.-in-part of U.S. 6,227,293. (English). CODEN: USXXAM. APPLICATION: US 2001-755228 20010105. PRIORITY: US 2000-500669 20000209.

AB Intense and short-lived electromagnetic pulses are coupled with acoustic pulses into a petroleum reservoir, which mobilized petroleum and increases flow of recovered crude oil. The acoustic pulses are derived from the plasma vaporization of water. Among other configurations, electrohydraulic and electromagnetic generators are placed in a movable emitter that can be passed between productive zones and generate acoustic vibrations and electromagnetically induced high-frequency vibrations over a desired vol. of the reservoir. The method can be used with other enhanced oil recovery methods, such as waterflooding, CO<sub>2</sub>-flooding, surfactant flooding, etc., for enhanced recovery of heavy petroleum. In addn., the methods can also be used for recovery or sepn. of other petroleum components or other underground material, such as natural gas, methane, natural gas condensates, casinghead naphtha, N<sub>2</sub>, Ar, He, O<sub>2</sub>, H<sub>2</sub>S, CO<sub>2</sub>, SO<sub>2</sub>, B, V, Ni, S, and asphaltenes.

IT 7446-09-5, Sulfur dioxide, processes  
7704-34-9, Sulfur, processes 7782-44-7, Oxygen, processes

(recovery of, coupled electromagnetic and acoustic pulse-based stimulation of petroleum reservoirs)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 7782-44-7 HCA  
 CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IC ICM E21B043-25  
 ICS E21B028-00  
 INCL 166248000  
 CC 51-1 (Fossil Fuels, Derivatives, and Related Products)  
 IT 124-38-9, Carbon dioxide, processes 7440-02-0, Nickel, processes  
 7440-37-1, Argon, processes 7440-42-8, Boron, processes  
 7440-59-7, Helium, processes 7440-62-2, Vanadium, processes  
**7446-09-5, Sulfur dioxide, processes**  
**7704-34-9, Sulfur, processes 7727-37-9, Nitrogen, processes**  
**7782-44-7, Oxygen, processes 7783-06-4, Hydrogen sulfide, processes**  
**(recovery of; coupled electromagnetic and acoustic pulse-based stimulation of petroleum reservoirs)**

L52 ANSWER 5 OF 24 HCA COPYRIGHT 2005 ACS on STN

133:111868 Dust formation in carbon-rich Wolf-Rayet stars. Part 1. Chemistry of small carbon clusters and silicon species. Cherchneff, I.; Le Teuff, Y. H.; Williams, P. M.; Tielens, A. G. G. M. (Department of Physics, UMIST, Manchester, M60 1QD, UK). Astronomy and Astrophysics, 357(2), 572-580 (English) 2000. CODEN: AAEJAF. ISSN: 0004-6361. Publisher: Springer-Verlag.

AB The formation of small C chains and mol. precursors to SiC grains was investigated in the hot, hostile environment of C-rich Wolf-Rayet (WC) winds. We consider only WC stars which produce dust on a continuous basis and develop for the 1st time non-equil., chem. kinetic routes to nucleating dust precursors in the outflow. These can be used to calc. quant. the yield of such dust precursors for various outflow scenarios. Because WC stars have lost all their H in the WN phase, the chem. processes used in the model involve a pure He, C, O, Si, and S chem. which resembles that encountered in graphite or metal vaporization expts. in the lab. We derive abundances for small linear C clusters up to C6 and Si-bearing species for various wind parameters and conclude that high-d. regions in the form of clumps or disks are of paramount importance to the formation of dust in WC stars.

IT **7446-09-5, Sulfur dioxide, occurrence 7704-34-9, Sulfur, occurrence**  
**(dust formation in C-rich Wolf-Rayet stars including chem. of small C clusters and Si species)**

RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 73-9 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)  
 IT 409-21-2, Silicon carbide (SiC), occurrence 463-58-1, Carbon oxide sulfide (COS) 630-08-0, Carbon monoxide, occurrence 2944-05-0, Carbon monosulfide . 7440-21-3, Silicon, occurrence 7440-44-0D, Carbon, clusters, occurrence 7446-09-5, Sulfur dioxide, occurrence 7704-34-9, Sulfur, occurrence 7782-44-7, Oxygen, occurrence 10097-28-6, Oxosilylene 12070-15-4, 1,2-Ethyne diyl 12071-27-1, Silicon carbide (SiC2) 12075-35-3, 1,2-Propadiene-1,3-diylidene 12144-04-6, Carbon monoxide(1+), occurrence 12169-37-8, Carbon oxide sulfide (COS), ion(1+) 12181-61-2, Carbon dioxide(1+), occurrence 12185-07-8, Oxygen, ion (O21+) 12351-95-0, Carbon sulfide (CS), ion(1+) 12359-18-1, Silyliumyl, oxo- 12359-46-5, Silyliumyl, thioxo- 12439-77-9, Sulfur dioxide(1+) 12504-41-5, Silicon sulfide (SiS) 12595-78-7, Ethynyl, ion(1-) 12595-79-8, 2-Ethyne-1-yl 12597-02-3, Sulfur, ion (S21+), occurrence 13827-32-2, Sulfur monoxide 14067-05-1, Carbon1+, occurrence 14067-07-3, Silicon1+, occurrence 14337-00-9, Carbon1-, occurrence 14337-01-0, Oxygen1-, occurrence 14337-03-2, Sulfur1-, occurrence 14581-93-2, Oxygen1+, occurrence 14701-12-3, Sulfur1+, occurrence 16092-61-8, Carbon2+, occurrence 17778-80-2, occurrence 23550-45-0, Sulfur, mol (S2), occurrence 78393-58-5, Silicon(1+), methanetetrayl 109292-47-9, 1,2-Propadien-1-yl-3-ylidene, ion(1-) 118090-85-0, 1,2-Propadien-1-yl-1-yl-3-ylidene 146021-58-1, Silicon(1+), dimethanetetrayl 175780-11-7, Carbon, mol (C4), occurrence 767269-11-4, Sulfur oxide, ion (SO+)  
 (dust formation in C-rich Wolf-Rayet stars including chem. of small C clusters and Si species)

L52 ANSWER 6 OF 24 HCA COPYRIGHT 2005 ACS on STN

132:55238 Reaction of SO<sub>2</sub> with ZnO(0001)-O and ZnO powders.Photoemission and XANES studies on the formation of SO<sub>3</sub> and SO<sub>4</sub>.

Rodriguez, J. A. J. A.; Jirsak, T.; Chaturvedi, S.; Kuhn, M.

(Department of Chemistry, Brookhaven National Laboratory, Upton, NY, USA). Surface Science, 442(3), 400-412 (English) 1999.

CODEN: SUSCAS. ISSN: 0039-6028. Publisher: Elsevier Science B.V..

AB Synchrotron-based high-resoln. photoemission and x-ray absorption near-edge spectroscopy (XANES) were used to study the interaction of

SO<sub>2</sub> with ZnO(0001)-O and polycryst. films and bulk powders of ZnO. The adsorption of SO<sub>2</sub> on the (0001) oxygen-terminated face of ZnO at 110 K produced SO<sub>3</sub> species which were stable up to temps. well above 400 K. On polycryst. ZnO, the Zn.tautm.SO<sub>2</sub> interactions were very weak, there was no decompn. of the admol., and evidence for bonding of Zn to SO<sub>2</sub> was found only at low temps. (.apprxeq.100 K) when the adsorbate had a limited mobility on the surface. At 300 K and moderate pressures, SO<sub>2</sub> only reacted with the oxygen centers of ZnO forming mainly SO<sub>3</sub> groups. Part of the formed SO<sub>3</sub> decompd. at temps. between 400 and 600 K with evolution of SO<sub>2</sub> into the gas phase (ZnSO<sub>3</sub>, solid .fwdarw. SO<sub>2</sub>,gas + ZnO, solid). At 600 K, a significant amt. of SO<sub>3</sub> was still present on the ZnO systems. Reaction with O<sub>2</sub> led to an SO<sub>3</sub> .fwdarw. SO<sub>4</sub> transformation on ZnO(0001)-O and powders of ZnO previously exposed to SO<sub>2</sub>. SO<sub>4</sub> was directly formed during the adsorption of SO<sub>2</sub> on polycryst. surfaces of ZnO that were rich in oxygen atoms which had a low coordination no. (<3) and a relatively high mobility. On ZnO(0001)-O and polycryst. ZnO, there was no decompn. of SO<sub>2</sub>. Promotion with K and Cs facilitated the cleavage of S-O bonds. After dosing SO<sub>2</sub> to (.sqroot.3 .times. .sqroot.3)-K/ZnO(0001)-O and (.sqroot.3 .times. .sqroot.3)-Cs/ZnO(0001)-O at 300 K, several sulfur species (S, SO<sub>3</sub>, SO<sub>4</sub>) coexisted on the alkali-metal-promoted surfaces whereas only SO<sub>3</sub> was formed on the **pure** ZnO(0001)-O system.

IT 7704-34-9, Sulfur, formation (nonpreparative)  
(formation in reaction of SO<sub>2</sub> with ZnO(0001)-O and ZnO powders)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, reactions  
(formation of SO<sub>3</sub> and SO<sub>4</sub> in reaction of SO<sub>2</sub> with ZnO(0001)-O and ZnO powders)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 66-3 (Surface Chemistry and Colloids)  
IT 7446-11-9, Sulfurtrioxide, formation (nonpreparative)  
7704-34-9, Sulfur, formation (nonpreparative) 14808-79-8,  
Sulfate, formation (nonpreparative)  
(formation in reaction of SO<sub>2</sub> with ZnO(0001)-O and ZnO powders)  
IT 1314-13-2, Zinc oxide, reactions 7446-09-5, Sulfur  
dioxide, reactions 17778-80-2D, Oxygen, atomic, zinc  
oxide-terminating, reactions

(formation of SO<sub>3</sub> and SO<sub>4</sub> in reaction of SO<sub>2</sub> with ZnO(0001)-O and ZnO powders)

L52 ANSWER 7 OF 24 HCA COPYRIGHT 2005 ACS on STN

131:276032 Recovery of H<sub>2</sub>S in coke oven gas as elemental sulfur and ammonium sulfate by catalytic oxidation. Park, Dae Won; Chun, Sung Woo; Kim, Hyo Sun; Woo, Hee Chul; Chung, Jong Shik (Department of Chemical Engineering, Pusan National University, Pusan, 609-735, S. Korea). Studies in Surface Science and Catalysis, 121(Science and Technology in Catalysis 1998), 457-460 (English) 1999.

CODEN: SSCTDM. ISSN: 0167-2991. Publisher: Elsevier Science B.V..

AB Selective catalytic oxidn. of coke oven gas H<sub>2</sub>S in the presence of excess water and NH<sub>3</sub> over V<sub>2</sub>O<sub>5</sub>/SiO<sub>2</sub> catalyst was studied. H<sub>2</sub>S was successfully converted to the mixt. of elemental S and ammonium thiosulfate without considerable SO<sub>2</sub> emission. Plausible reaction steps are proposed to describe kinetic exptl. results.

IT 7446-09-5, Sulfur dioxide, processes

(conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, Oxygen, reactions

(conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9P, Sulfur, processes

(elemental; conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51, 67

IT 7446-09-5, **Sulfur dioxide**, processes  
(conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

IT 7664-41-7, Ammonia, reactions 7732-18-5, Water, reactions  
7782-44-7, Oxygen, reactions  
(conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

IT 7704-34-9P, Sulfur, processes  
(elemental; conversion/recovery of hydrogen sulfide from coke oven gas as elemental sulfur and ammonium thiosulfate by selective catalytic oxidn. over silica-supported vanadia catalyst in presence of excess water, ammonia, and oxygen)

L52 ANSWER 8 OF 24 HCA COPYRIGHT 2005 ACS on STN

131:259736 O2/recycled flue gas combustion-applied powdered coal fired power plant for recovery. Yamada, Toshihiko; Kiga, Takashi; Fujita, Naofumi; Inoue, Toshio (Combustion Engineering Department, Power Plant Division, Energy Plants, Japan). IHI Engineering Review, 32(3), 98-103 (English) 1999. CODEN: IHERA6. ISSN: 0018-9820. Publisher: Ishikawajima-Harima Heavy Industries Co., Ltd..

AB Amid growing concerns internationally about reducing CO2 emissions, fossil fuel-fired power plants are now being targeted as a source of CO2 emissions that results in environmental problems. To improve this situation, it is necessary to advance the study of O2/RFG combustion-applied pulverized coal fired power plant for CO2 recovery. This power plant system is characterized by effective O2/RFG combustion, gas recirculation, and pressure control in the furnace through use of CO2 compressors and oxygen concn. controls at several points. Possibility of practical application and safety were confirmed after plant simulation and examn.

IT 7782-44-7, Oxygen, analysis  
(O2/recycled flue gas combustion-applied powdered coal fired power plant for CO2 recovery)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O—O

IT 7446-09-5, **Sulfur dioxide**, analysis

**7704-34-9, Sulfur, analysis**

(O2/recycled flue gas combustion-applied powdered  
coal fired power plant for CO2 recovery)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 48, 59

IT **7782-44-7, Oxygen, analysis**

(O2/recycled flue gas combustion-applied powdered coal fired  
power plant for CO2 recovery)

IT 74-82-8, Methane, analysis 630-08-0, Carbon monoxide, analysis

1333-74-0, Hydrogen, analysis 7440-44-0, Carbon, analysis

**7446-09-5, Sulfur dioxide, analysis**

**7704-34-9, Sulfur, analysis 7727-37-9, Nitrogen, analysis**

10102-43-9, Nitrogen oxide (NO), analysis 11104-93-1, Nitrogen  
oxide, analysis 12385-13-6, Atomic hydrogen, analysis

17778-80-2, Atomic oxygen, analysis

(O2/recycled flue gas combustion-applied powdered  
coal fired power plant for CO2 recovery)

L52 ANSWER 9 OF 24 HCA COPYRIGHT 2005 ACS on STN

130:239493 Simulation of once-through sulfur Claus process.

El-Bishtawi, Ribhi; Haimour, No'man (Department of Chemical

Engineering, University of Jordan, Amman, Jordan). Dirasat: Natural  
and Engineering Sciences, 24(1), 7-18 (English) 1997.

CODEN: DNESFZ. ISSN: 1026-3756. Publisher: University of Jordan,  
Deanship of Academic Research.

AB A computer program was developed to simulate the once-through Claus  
process. The effects of changing N2/O2 ratio on sulfur recovery,  
adiabatic flame temp., heat recovery, molar flowrates and the  
capacity of the unit were detd. By using **pure**  
**oxygen** instead of air, the percentage sulfur recovery from  
the first condenser is increased from 75.25% to 82.63%, the  
adiabatic flame temp. is increased from 1500.degree. to  
2725.degree., the amt. of heat recovered from the waste heat boiler  
is increased by 5%, the total molar flowrate is decreased by 56% in  
the furnace, 62% in the waste heat boiler, 65% in the condensers and  
65% in the catalytic converters. The capacity of the unit can be

increased by 163%. A modified unit is suggested, which consists of a furnace, a waste heat boiler, a sulfur condenser and a water condenser with recycling of effluent gases. A purge stream is required to keep the level of inerts concn. to an acceptable level.

IT 7704-34-9P, Sulfur, preparation  
 (simulation of once-through sulfur Claus process)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, reactions  
 (simulation of once-through sulfur Claus process)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 49-1 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 59  
 IT 7704-34-9P, Sulfur, preparation  
 (simulation of once-through sulfur Claus process)  
 IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen,  
 reactions 7783-06-4, Hydrogen sulfide, reactions  
 (simulation of once-through sulfur Claus process)

L52 ANSWER 10 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 130:170530 Manufacture of valuable products from low-rank coal. koya,  
 Toshiyuki; Shiraishi, Takao; Murase, Hiroshi; Shimizu, Tadaaki;  
 Matsukata, Masahiko (Ebara Corp., Japan). Jpn. Kokai Tokkyo Koho JP  
 11035958 A2 19990209 Heisei, 5 pp. (Japanese). CODEN:  
 JKXXAF. APPLICATION: JP 1997-194485 19970718.

AB The title method comprises (1) deashing-desulfurizing a low-rank coal to obtain a low-pollution fuel by a deashing-desulfurizing app., (2) moisture adjusting the high-ash, high-S and high-water-contg. residual coal from the stage (1) by a water-adjusting app., (3) combusting-slagging the moisture-adjusted residual coal to obtain a slag by combusting with pure O, (4) power-generating by steam with waste-heat recovery, and (5) manufg. elemental S or H<sub>2</sub>SO<sub>4</sub> by supplying SO<sub>2</sub>-contg. exhaust gas from the stage (3) after recovery of fly ashes.  
 IT 7704-34-9P, Sulfur, preparation  
 (elemental; manuf. of valuable products from low-rank coal)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, reactions  
(exhaust gases contg.; in manuf. of valuable products from  
low-rank coal)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM C10L005-00  
ICS C01B017-04; C01B017-69; C10K001-10  
CC 51-17 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 49, 52  
IT 7704-34-9P, Sulfur, preparation  
(elemental; manuf. of valuable products from low-rank coal)  
IT 7446-09-5, Sulfur dioxide, reactions  
(exhaust gases contg.; in manuf. of valuable products from  
low-rank coal)

L52 ANSWER 11 OF 24 HCA COPYRIGHT 2005 ACS on STN  
129:346660 KEMA's hot gas clean-up process. Meijer, R.; Janssen, F. J.  
J. G.; Farina, G. L.; Hellendoorn, J. W. H. (Business Unit KEMA  
Fossil Power Plants, KEMA Nederland B.V., Arnhem, 6800, Neth.).  
High Temperature Gas Cleaning, [Papers presented at the  
International Symposium and Exhibition on Gas Cleaning at High  
Temperatures], 3rd, Karlsruhe, Sept. 18-20, 1996, 638-647.  
Editor(s): Schmidt, Eberhard. Institut fuer Mechanische  
Verfahrenstechnik und Mechanik der Universitaet Karlsruhe (TH):  
Karlsruhe, Germany. (English) 1996. CODEN: 66SOAC.

AB KEMA developed and patented a sorbent and hot gas cleanup process  
(HGCK) to clean flue gas from coal, oil, and biomass gasification  
processes. The main feature of this process is its continuous dry  
desulfurization system, applying a supported sorbent developed and  
patented by KEMA. The desulfurization sorbent is transported  
between 2 bubbling fluidized bed reactor systems, one of which acts  
as absorber and the other as regenerator. The primary regeneration  
product is elemental S. Exptl. work showed the sorbent can also  
remove HCN and NH<sub>3</sub> simultaneously with H<sub>2</sub>S and COS. Process  
integration calcns. for application of the HGCK process in a 550 MWe  
indicated that with the HGCK process, a significant improvement in  
plant efficiency and a strong redn. of investment costs vs.  
conventional cold gas cleaning is achievable. Lower annual  
operating costs lead to a significant redn. of the cost of  
electricity produced. In 1995, KEMA and Foster Wheeler agreed to  
develop a com. hot gas clean-up process based on fluidized bed

technol. and direct S prodn. This program consists of a cold model test, followed by demonstration of the HGCK process on an IGCC plant slipstream.

IT 7704-34-9P, Sulfur, processes  
 (regenerable sorbents for hot flue gas desulfurization clean-up process)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, uses  
 7782-44-7, Oxygen, uses  
 (sorbent regeneration using; regenerable sorbents for hot flue gas desulfurization clean-up process)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7782-44-7 HCA  
 CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 51  
 IT 7704-34-9P, Sulfur, processes  
 (regenerable sorbents for hot flue gas desulfurization clean-up process)  
 IT 7446-09-5, Sulfur dioxide, uses  
 7782-44-7, Oxygen, uses  
 (sorbent regeneration using; regenerable sorbents for hot flue gas desulfurization clean-up process)

L52 ANSWER 12 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 129:346654 Sulfidation-regeneration kinetics of zinc titanate sorbents. Mojtabahedi, Wahab; Konttinen, Jukka; Gangwal, Santosh (Enviropower Inc., Tampere, 33701, Finland). High Temperature Gas Cleaning, [Papers presented at the International Symposium and Exhibition on Gas Cleaning at High Temperatures], 3rd, Karlsruhe, Sept. 18-20, 1996, 557-568. Editor(s): Schmidt, Eberhard. Institut fuer Mechanische Verfahrenstechnik und Mechanik der Universitaet Karlsruhe (TH): Karlsruhe, Germany. (English) 1996.  
 CODEN: 66SOAC.

AB Advanced integrated gasification combined-cycle power systems incorporate pressurized coal gasification and hot-gas cleanup. A high-temp., high-pressure (HTHP) S removal sub-system is a key component of the hot-gas clean-up train. H<sub>2</sub>S is the main S compd. in coal gasifier gas. Regenerable Zn-based mixed-metal oxide sorbents, which can be regenerated for multi-cycle operation using air, are typically used to remove H<sub>2</sub>S to <50 ppmv. Zinc titanate sorbents are currently leading sorbent candidates for fluidized-bed, reactor-based desulfurization sub-systems; data on sulfidation and regeneration kinetics of these sorbents are needed for reliable system design. Sulfidation kinetics of a no. of zinc titanate sorbents were evaluated using a thermogravimetric analyzer (TGA) and a high-pressure micro fixed-bed reactor (MFBR) at 0.1-2.0 MPa and 400-600.degree. in the presence of simulated U-Gas. Regeneration kinetics of a selected sorbent was evaluated using TGA at 0.1 MPa and 400-775.degree. as a function of O<sub>2</sub> concn. (0.2-2.92 vol. percent) and SO<sub>2</sub> concn. (0.18-2.58 vol. percent). All data were fitted using Class II, second-order rate equations. Sulfidation rate consts. from the MFBR were 4-6 times smaller than those from TGA; potential reasons for this disagreement are discussed. TGA data indicated the sulfidation reaction has an activation energy of .apprx.77 kJ/mol, whereas the regeneration reaction has an activation energy of .apprx.200 kJ/mol. The presence of SO<sub>2</sub> in regeneration gas did not have a retarding effect on overall regeneration rates at temps. 575-725.degree.. Data further indicated that ZnSO<sub>4</sub> formation during regeneration can be minimized by keeping the sorbent sulfided to at least a 10% conversion level. Application and implications of results obtained for design of a continuous large-scale fluidized-bed reactor system are discussed.

IT 7782-44-7, Oxygen, processes  
(regenerating zinc titanate sorbent with; sulfidation-regeneration kinetics of zinc titanate sorbents for hot coal-fired power generation and coal gasification flue gases)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5, Sulfur dioxide, processes  
7704-34-9, Sulfur, processes  
(sulfidation-regeneration kinetics of zinc titanate sorbents for hot coal-fired power generation and coal gasification flue gases)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51, 67  
IT 7782-44-7, Oxygen, processes  
(regenerating zinc titanate sorbent with; sulfidation-regeneration kinetics of zinc titanate sorbents for hot coal-fired power generation and coal gasification flue gases)  
IT 7446-09-5, Sulfur dioxide, processes  
7704-34-9, Sulfur, processes 7783-06-4, Hydrogen sulfide, processes  
(sulfidation-regeneration kinetics of zinc titanate sorbents for hot coal-fired power generation and coal gasification flue gases)

L52 ANSWER 13 OF 24 HCA COPYRIGHT 2005 ACS on STN  
128:184004 Refineries have to do a retrofit. Oxygen increases the desulfurization capacity of Claus units. Gross, Gerhard (Germany). Chemie-Anlagen + Verfahren, 31(2), 56-57 (German) 1998.  
CODEN: CHAVBZ. ISSN: 0009-2800. Publisher: Konradin Verlag Robert Kohlhammer.

AB Liq. fuels were desulfurized in the refineries with so-called hydrotreaters, and thereby a gaseous mixt. with a content of up to 90% H<sub>2</sub>S was formed. This co-called "Claus-gas" was combusted with air to S, which was used for industrial processes such as the synthesis of H<sub>2</sub>SO<sub>4</sub>. An improved Claus combustion chamber is presented, working with pure O<sub>2</sub> in the secondary combustion stage. The S-throughput was increased with this technol. to 55%. Investment costs for the implementation of this new technol. into the Claus plant are given.

IT 7704-34-9P, Sulfur, preparation  
(sulfur manuf. by postcombustion of Claus gas with oxygen in desulfurization of liq. fuels in petroleum refineries with hydrotreaters)

RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, reactions  
(sulfur manuf. by postcombustion of Claus gas with oxygen in desulfurization of liq. fuels in petroleum refineries with hydrotreaters)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 49, 51  
IT 7704-34-9P, Sulfur, preparation  
(sulfur manuf. by postcombustion of Claus gas with oxygen in desulfurization of liq. fuels in petroleum refineries with hydrotreaters)  
IT 7446-09-5, Sulfur dioxide, reactions  
(sulfur manuf. by postcombustion of Claus gas with oxygen in desulfurization of liq. fuels in petroleum refineries with hydrotreaters)

L52 ANSWER 14 OF 24 HCA COPYRIGHT 2005 ACS on STN  
124:149991 Sulfur recovery from sulfur-containing streams. Cieutat, Denis; Schmidt, Emmanuel (Air Liquide, Fr.; Air Liquide America Corp.). Fr. Demande FR 2718726 A1 19951020, 24 pp.  
(French). CODEN: FRXXBL. APPLICATION: FR 1995-4539 19950414.

AB The process comprises recovering a a SO<sub>2</sub>-contg. gas from a sulfurous waste gas-treating app., introducing a H<sub>2</sub>S-contg. gas into a Claus unit, reacting at least part of the SO<sub>2</sub>-contg. gas in the Claus unit, and a recovering a S-based product from the Claus unit. The sulfurous waste gas may be gas from a H<sub>2</sub>SO<sub>4</sub> regenerating unit. This process is esp. suitable for use in refineries.

IT 7782-44-7, Oxygen, uses  
(sulfur recovery from sulfur-contg. streams in refineries)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7446-09-5, Sulfur dioxide, processes  
(sulfur recovery from sulfur-contg. streams in refineries)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O—S—O

IT 7704-34-9P, Sulfur, preparation  
(sulfur recovery from sulfur-contg. streams in refineries)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM C01B017-04  
CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 51  
IT 7782-44-7, Oxygen, uses  
(sulfur recovery from sulfur-contg. streams in refineries)  
IT 7446-09-5, Sulfur dioxide, processes  
7783-06-4, Hydrogen sulfide, processes  
(sulfur recovery from sulfur-contg. streams in  
refineries)  
IT 7664-93-9P, Sulfuric acid, preparation 7704-34-9P, Sulfur,  
preparation  
(sulfur recovery from sulfur-contg. streams in refineries)

L52 ANSWER 15 OF 24 HCA COPYRIGHT 2005 ACS on STN

121:38660 Desulfurization of hydrogen sulfide-containing gases in a  
Claus plant, and post-combustion and scrubbing of the waste gases.  
Heisel, Michael; Marold, Freimut (Linde AG, Germany). Ger. Offen.  
DE 4239811 A1 19940601, 12 pp. (German). CODEN: GWXXBX.

APPLICATION: DE 1992-4239811 19921126.

AB In this process, in which the SO<sub>2</sub> collected in the scrubber is  
recycled to the Claus plant, 60-90, preferably 67-85, esp. 67-80% of  
the S in the feed gas is directly removed, and 10-33, preferably  
10-25, esp. 15-20% of the S is **recycled SO<sub>2</sub>**.  
This process has high S-recovery rates, and substantially lowers  
other emissions. CO, H, S(g), H<sub>2</sub>S, CS<sub>2</sub>, COS, NH<sub>3</sub>, and HCN in the  
offgass from the Claus plant are used as fuel gas.

IT 7782-44-7P  
(combustion, of offgas from Claus plant, for high yield by  
scrubbing and **recycling of sulfur  
dioxide**)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9

(hydrocarbons, Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, **Sulfur dioxide**, uses

(recycling of, from post-combustion and scrubbing of waste gas from Claus plant, for high sulfur yield)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7704-34-9, **Sulfur**, reactions

(vapors, Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM C01B017-04

ICS C01B017-60; B01D053-36; F23G007-06

CC 49-1 (Industrial Inorganic Chemicals)

ST sulfur dioxide Claus waste gas combustion; scrubbing  
**recycling sulfur dioxide**

IT Hydrocarbons, reactions

(Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

IT Combustion

(of offgas from Claus plant, for high yield by scrubbing and  
**recycling of sulfur dioxide**)

IT 74-90-8, Hydrogen cyanide, reactions 75-15-0, Carbon disulfide, reactions 463-58-1, Carbonyl sulfide 630-08-0, Carbon monoxide, reactions 7664-41-7, Ammonia, reactions

(Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

IT 7782-44-7P

(combustion, of offgas from Claus plant, for high yield by scrubbing and **recycling of sulfur dioxide**)

IT 7704-34-9

(hydrocarbons, Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

IT 7446-09-5, **Sulfur dioxide**, uses

(**recycling of**, from post-combustion and scrubbing of waste gas from Claus plant, for high sulfur yield)

IT 7783-06-4, **Hydrogen sulfide**, uses

(removal of, from waste gase, Claus process with post-combustion and scrubbing for, for **sulfur dioxide recycle**)

IT 7704-34-9, **Sulfur**, reactions

(vapors, Claus plant waste gases contg. hydrogen sulfide and, combustion and scrubbing of, for **sulfur dioxide recycle** and high sulfur yield)

L52 ANSWER 16 OF 24 HCA COPYRIGHT 2005 ACS on STN

120:81342 High temperature regenerable hydrogen sulfide removal agents for desulfurization in coal gasification. Copeland, Robert J. (TDA Research, Inc., USA). U.S. US 5271907 A 19931221, 21 pp. (English). CODEN: USXXAM. APPLICATION: US 1992-844829 19920303.

AB A system for high temp. desulfurization of coal-derived gases uses regenerable sorbents. One sorbent is stannic oxide (tin oxide, SnO<sub>2</sub>), the other sorbent is a metal oxide or mixed metal oxide such as zinc ferrite (ZnFe<sub>2</sub>O<sub>4</sub>). Certain otherwise undesirable byproducts, including hydrogen sulfide (H<sub>2</sub>S) and **sulfur dioxide** (SO<sub>2</sub>) are **reused** by the system, and elemental sulfur is produced in the regeneration reaction. A system for refabricating the sorbent pellets is also described.

IT 7782-44-7, **Oxygen**, uses

(for sorbent regeneration in desulfurization in coal gasification)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9P, **Sulfur**, preparation

(formation of, in coal gasification with desulfurization using regenerable sorbents)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, miscellaneous  
(removal of, in coal gasification with regenerable sorbents)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM B01D053-02  
INCL 422178000  
CC 51-20 (Fossil Fuels, Derivatives, and Related Products)  
IT 7782-44-7, Oxygen, uses  
(for sorbent regeneration in desulfurization in coal  
gasification)  
IT 7704-34-9P, Sulfur, preparation  
(formation of, in coal gasification with desulfurization using  
regenerable sorbents)  
IT 7446-09-5, Sulfur dioxide, miscellaneous 7783-06-4,  
Hydrogen sulfide, miscellaneous  
(removal of, in coal gasification with regenerable sorbents)

L52 ANSWER 17 OF 24 HCA COPYRIGHT 2005 ACS on STN  
117:257286 Treatment of gas. Rathbone, Thomas (BOC Group PLC, UK).  
Brit. UK Pat. Appl. GB 2250217 A1 19920603, 20 pp.  
(English). CODEN: BAXXDU. APPLICATION: GB 1991-25057 19911126.  
PRIORITY: GB 1990-25846 19901128.

AB Gases contg. H<sub>2</sub>S are partially combusted in a furnace with O<sub>2</sub> from  
an air sepn. process to form SO<sub>2</sub> and H<sub>2</sub>O; a portion of the SO<sub>2</sub>  
reacts with the H<sub>2</sub>S to form elemental S which is condensed out and  
recovered. The N<sub>2</sub> recovered from the air sepn. is recompressed to  
.gtoreq.2 atm., heat exchanged with the hot gas stream, and expanded  
in a gas turbine to recover useful energy. The method is  
cost-effective and suitable for both waste gases and petroleum  
processing gases.

IT 7704-34-9P, Sulfur, preparation  
(recovery of, from waste gases, by Claus process, heat recovery  
in)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, miscellaneous

(removal of, from waste gases, by Claus process, in)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IC ICM B01D053-34  
ICS C01B017-04

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 49, 51

IT Air purification

(sepn., oxygen and nitrogen from, in heat and sulfur  
recovery from waste gases by Claus process)

IT 7704-34-9P, Sulfur, preparation

(recovery of, from waste gases, by Claus process, heat recovery  
in)

IT 7446-09-5, Sulfur dioxide, miscellaneous

(removal of, from waste gases, by Claus process, in)

L52 ANSWER 18 OF 24 HCA COPYRIGHT 2005 ACS on STN

117:218984 Heat exchanger and pollutant removal system for flue gas  
treatment.. Johnson, Arthur F. (USA). U.S. US 5122352 A

19920616, 8 pp. Cont.-in-part of U.S. Ser. No. 372,492,  
abandoned. (English). CODEN: USXXAM. APPLICATION: US 1990-567492  
19900814. PRIORITY: US 1988-165312 19880308; US 1989-372492  
19890628.

AB SO<sub>2</sub> and SO<sub>3</sub> are removed from flue gases by 2-step cooling in the  
heat exchanger furnished with 2 condensing sections. In the 1st  
step SO<sub>3</sub> is condensed to H<sub>2</sub>SO<sub>4</sub> and removed from the heat exchanger;  
alternatively, a (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> soln. is removed from the heat exchanger  
when a small amt. of base, e.g., NH<sub>4</sub>OH, is added to the flue gases.  
In the 2nd step the flue gas is cooled in a much longer length of  
closely spaced layers of boiler feedwater tubes to dissolve the S  
which has oxidized to SO<sub>2</sub> (sol. in cold water); the resulting SO<sub>2</sub>  
soln. can then be subjected to vacuum to recover  
SO<sub>2</sub>, which in turn can be absorbed by a (NH<sub>4</sub>)<sub>2</sub>SO<sub>3</sub> soln. to  
give (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The heat-exchange efficiency is substantially  
improved.

IT 7782-44-7, Oxygen, uses

(in removal of sulfur compds. from flue gases by two-step  
cooling)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7446-09-5, Sulfur dioxide, miscellaneous 7704-34-9  
 , Sulfur, miscellaneous  
 (removal of, from flue gases, two-step cooling in)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM C01B017-00  
 ICS C01B017-69; C01C001-24; F28B003-00  
 INCL 423242000  
 CC 59-4 (Air Pollution and Industrial Hygiene)  
 IT 7664-41-7, Ammonia, uses 7664-93-9, Sulfuric acid, uses  
 7782-44-7, Oxygen, uses 7783-20-2, Ammonium sulfate, uses  
 10028-15-6, Ozone, uses 10102-44-0, Nitrogen dioxide, uses  
 10196-04-0, Ammonium sulfite 14798-03-9, Ammonium, uses  
 (in removal of sulfur compds. from flue gases by two-step  
 cooling)  
 IT 7446-09-5, Sulfur dioxide, miscellaneous 7446-11-9, Sulfur  
 trioxide, miscellaneous 7704-34-9, Sulfur, miscellaneous  
 11104-93-1, Nitrogen oxide, miscellaneous  
 (removal of, from flue gases, two-step cooling in)

L52 ANSWER 19 OF 24 HCA COPYRIGHT 2005 ACS on STN  
 116:158053 Cyclic process for the removal of **sulfur**

**dioxide and the recovery of sulfur from gases.**

Lo, Ching Lung (USA). U.S. US 5066470 A 19911119, 5 pp.

(English). CODEN: USXXAM. APPLICATION: US 1990-550319 19900709.

AB Gases contg. SO<sub>2</sub> are scrubbed with an aq. Fe<sup>3+</sup> soln. contg. BaCl<sub>2</sub> or CaCl<sub>2</sub> to form SO<sub>3</sub> which forms H<sub>2</sub>SO<sub>4</sub> in water. The H<sub>2</sub>SO<sub>4</sub> reacts with the Ba or Ca to form the sulfate which is pptd. and sepd. by filtration. The BaSO<sub>4</sub> or CaSO<sub>4</sub> is reduced to BaS or CaS, using a carbonaceous material or reducing gas. The BaS or CaS is reacted with another portion of the Fe<sup>3+</sup>-contg. soln. to form elemental S and regenerate BaCl<sub>2</sub> or CaCl<sub>2</sub>. After sulfur removal, this soln. is rich in Fe<sup>2+</sup> and is combined with the soln. from which BaSO<sub>4</sub> was removed and oxidized. The soln. can then be recycled. The method removes almost all the SO<sub>2</sub> as S in a closed system.

IT 7782-44-7, Oxygen, uses  
 (in sulfur dioxide removal from waste gases by cyclic process for  
 sulfur recovery)

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O==O

IT 7704-34-9P, Sulfur, preparation  
(recovery of, in sulfur dioxide  
removal from waste gases by cyclic process)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide, miscellaneous  
(removal of, from waste gases, cyclic process for sulfur recovery  
in)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O==S==O

IC ICM C01G001-00  
ICS C01B017-00; C01F007-74  
INCL 423242000  
CC 59-4 (Air Pollution and Industrial Hygiene)  
IT 7440-44-0, Carbon, uses 7647-01-0, Hydrochloric acid, uses  
7705-08-0, Ferric chloride, uses 7782-44-7, Oxygen, uses  
10043-52-4, Calcium chloride, uses 10361-37-2, Barium chloride,  
uses  
(in sulfur dioxide removal from waste gases by cyclic process for  
sulfur recovery)  
IT 7704-34-9P, Sulfur, preparation  
(recovery of, in sulfur dioxide  
removal from waste gases by cyclic process)  
IT 7446-09-5, Sulfur dioxide, miscellaneous  
(removal of, from waste gases, cyclic process for sulfur recovery  
in)

L52 ANSWER 20 OF 24 HCA COPYRIGHT 2005 ACS on STN  
109:195327 Equilibrium gas compositions for the sulfur dioxide-oxygen  
system and their application to the sulfidation of copper. Gawel,  
J.; Wyczesany, A. (Tech. Univ. Cracow, Krakow, 31-155, Pol.).  
Corrosion Science, 28(9), 867-72 (English) 1988. CODEN:  
CRRSAA. ISSN: 0010-938X.

AB Equil. compns. for theor. gas mixts. formed during heating of

pure and O contaminated SO<sub>2</sub> at 1073 K were calcd.

The partial pressure of S in these gas mixts. is sufficiently high for formation of some metal sulfides even if the O contamination of initial gases is relatively high. On this basis, the formation of Cu<sub>2</sub>S at high temps. is explained.

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous  
(partial pressure of, in contaminated oxygen atm., with respect  
to metal sulfidation)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7704-34-9  
(sulfurization and Sulfidization, of metals, in sulfur  
dioxide-contaminated oxygen)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 56-10 (Nonferrous Metals and Alloys)

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous  
(partial pressure of, in contaminated oxygen atm., with respect  
to metal sulfidation)

IT 7704-34-9  
(sulfurization and Sulfidization, of metals, in sulfur  
dioxide-contaminated oxygen)

L52 ANSWER 21 OF 24 HCA COPYRIGHT 2005 ACS on STN  
75:91643 Equilibria in the systems carbon-oxygen-sulfur and  
carbon-oxygen-sulfur-hydrogen as related to sulfur **recovery**  
from **sulfur dioxide**. Kellogg, H. H. (Henry  
Krumb Sch. Mines, Columbia Univ., New York, NY, USA). Metallurgical  
Transactions, 2(8), 2161-9 (English) 1971. CODEN: MTGTBF.  
ISSN: 0026-086X.

AB Equil. phase diagrams for the systems, showing gas compn. as a  
function of temp. for the C- and S-satn. surfaces, were calcd. from  
thermochem. data on the numerous gas species present. Recent exptl.  
work of J. Drowart, et al. (1967) was used to obtain consistent  
thermodynamic behavior for the 7 polymers of S (Sn, n = 2 to 8).  
For the system C-O-S-H, only the pseudoternary at the const. atom  
ratio H/C = 4.0 is presented. An iterative procedure, adapted for  
the digital computer, was used to solve the complex equil. involved.  
The influence of the equil. chemistry on the design of processes to  
reduce SO<sub>2</sub> with C, CO, and CH<sub>4</sub> is discussed. In all cases,

production of S vapor reaches a sharp max. at the gas compn. having the atom ratio  $(H + C)/O = (1 + X)/(2 + X/2)$ , where X is the atom ratio H/C in the reducing agent. Reducing agents with lower values of X yield better S recovery because of the smaller residual amt. of H<sub>2</sub>S and SO<sub>2</sub> in the reacted gas.

IT 7446-09-5, reactions  
(redn. of, by carbon compds.)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7782-44-7, properties  
(systems: carbon--hydrogen--sulfur--)

RN 7782-44-7 HCA

CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9, properties  
(systems: carbon--hydrogen--oxygen--)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

CC 68 (Phase Equilibria, Chemical Equilibria, and Solutions)

IT 7446-09-5, reactions  
(redn. of, by carbon compds.)

IT 7782-44-7, properties  
(systems: carbon--hydrogen--sulfur--)

IT 7704-34-9, properties  
(systems: carbon--hydrogen--oxygen--)

L52 ANSWER 22 OF 24 HCA COPYRIGHT 2005 ACS on STN

51:14597 Original Reference No. 51:3100a-b Recovery of sulfur from hydrogen sulfide. Conroy, Edward H., Jr.; Eads, David K.; West, James R. (Texas Gulf Sulphur Co.). US 2765217 19561002 (Unavailable). APPLICATION: US

AB Substantially quant. conversion of H<sub>2</sub>S and recovery of S are accomplished in a cyclic process in which H<sub>2</sub>S is converted to S by means of O and SO<sub>2</sub> which are added in stoichiometric amts. The gases, after cooling to condense S which is then removed, are passed into a secondary combustion chamber where sufficient O is used to oxidize unreacted H<sub>2</sub>S and uncondensed S to SO<sub>2</sub>. The latter is then

recovered, e.g. by liquid absorption.  
IT 7782-44-7, Oxygen  
(in sulfur recovery from H<sub>2</sub>S)  
RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

IT 7704-34-9, Sulfur  
(recovery of, from H<sub>2</sub>S)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 7446-09-5, Sulfur dioxide  
(sulfur recovery from H<sub>2</sub>S and)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 18 (Acids, Alkalies, Salts, and Other Heavy Chemicals)  
IT 7782-44-7, Oxygen  
(in sulfur recovery from H<sub>2</sub>S)  
IT 7704-34-9, Sulfur  
(recovery of, from H<sub>2</sub>S)  
IT 7446-09-5, Sulfur dioxide  
(sulfur recovery from H<sub>2</sub>S and)

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47:52693 Original Reference No. 47:8935g-i,8936a-i,8937a-e American  
Society for Testing Materials, Standards, 1952. V. Fuels, petroleum,  
aromatic hydrocarbons, engine antifreezes. 1253 pp. (Unavailable)  
1952.

AB Standards or tentative standards, adopted or revised in 1952 are  
given for: distn. of crude petroleum; gravity of petroleum and its  
products; ASTM-IP petroleum measurement tables; reduced pressure  
distn. of petroleum products; test for S in petroleum products and  
lubricants; test for water in petroleum products and other  
bituminous materials; test for water and sediment; definitions of  
terms relating to petroleum; test for C<sub>2</sub>H<sub>2</sub> in polymerization-grade  
butadiene; tests for b.p. range and butadiene content of  
polymerization-grade butadiene; carbonyl content of butadiene; test  
for 1,3-butadiene in C<sub>4</sub> hydrocarbon mixts.; measurement of f.ps. for

evaluation of purity; tests for O in butadiene vapors and for peroxides in butadiene; detn. of purity from f.p.s.; sampling petroleum and petroleum products; tests for sepn. of residue from butadiene and for butadiene dimer and nonvolatile residue of polymerization-grade butadiene; test for total inhibitor content (p-tert-butylcatechol) of butadiene; distn. test of gasoline, naphtha, kerosine, and similar petroleum products; test for viscosity and for flash and fire points; tests for flash point by Pensky-Martens closed tester and by Tag closed tester; method of calcg. viscosity index; conversion of kinematic viscosity to Saybolt Furrol viscosity; vacuum distn. of liquid and semi-solid asphaltic materials to obtain a residue of specified penetration; test for softening point; asphalt-base emulsions for use as protective coatings for built-up roofs; gasoline and aviation gasoline; acidity of residue from distn. of gasoline and of petroleum solvents; analysis of 60 octane no. iso-octane-normal heptane ASTM knock test reference fuel blends; test for aromatic hydrocarbons in olefin-free gasolines; test for autogenous ignition temps. of petroleum products; tests for C<sub>6</sub>H<sub>6</sub> and toluene, Br no. of petroleum distillates, color of refined petroleum oil, and color of U.S. Army motor fuel; measurement of d. and sp. gr. of liquids; distn. of natural gasoline; gaging petroleum and petroleum products; test for existent gum in fuels and in gasoline; test for H in petroleum fractions; test for knock characteristics of aviation and motor fuels; test for mercaptan S in jet fuels; test for olefins and aromatics in petroleum distillates; test for oxidation stability of gasoline and aviation gasoline; measurement of refractive index and refractive dispersion of hydrocarbon liquids; test for free and corrosive S in petroleum products; test for S in petroleum products; test for tetraethyllead in gasoline; tests for heat of combustion of liquids, and of vapor pressure of petroleum products; vol. calcns. and corrections in measurement of petroleum and petroleum products; test for water tolerance of aviation fuels; petroleum spirits; Stoddard solvent; reagent water; test for d. of hydrocarbon liquids; test for distn. range of lacquer solvents and diluents; tests for heptane no.; kauri-butanol value and nitrocellulose dilg. power of hydrocarbon solvents; test for olefinic plus aromatic hydrocarbons in petroleum distillates; classification of Diesel fuel oils; farm tractor fuels and fuel oils; test for aniline point and mixed aniline point of petroleum products and hydrocarbon solvents; test for ash content of petroleum oils; test for burning qualities of kerosine, mineral seal oil, and of long-time burning oil for railway use; test for C residue of petroleum products; test for cloud and pour points; distn. test of gas oil and similar distillate fuel oils; test for ignition value of Diesel fuels; test for neutralization value (acid and base nos.); test for sediment in fuel oil; conversion of kinematic viscosity to Saybolt universal viscosity; test for kinematic viscosity; test for Cl in lubricating

oils and greases; test for color of lubricating oil and petrolatum; test for diln. of crankcase oils; tests for steam emulsion of lubricating oils and evapn. loss of lubricating greases and oils; test for foaming characteristics of crankcase oils; chem. analysis for metals in lubricating oils; test for normal pentane and C6H6 insolubles in used lubricating oils; test for P in lubricating oils, lubricating-oil additives, and their concentrates; sampling coals classed according to ash content; lab. sampling and analysis of coal and coke; sampling and fineness test of powd. coal; sampling and analysis of coal for volatile-matter detn.; test for grindability and screen analysis of coal; drop shatter and tumbler tests for coal; designating the size of coal from screen analysis; test for size of anthracite; tests for sieve analysis and cu. ft. of crushed bituminous coal; index of dustiness of coal and coke; test for free-swelling index of coal; classification of coals by rank and grade; gas and coking coals; sieves for testing purposes; definitions of terms relating to coal and coke, gross and net calorific values of solid and liquid fuels, and of com. varieties of bituminous and sub-bituminous coals; sampling coke for analysis; test for vol. of cell space of lump coke; drop shatter and tumbler tests of coke; tests for sieve analysis and cu. ft. wt. of coke; test for sp. gr. and calorific value of gaseous fuels; analysis of natural gases and related types of gaseous mixts.; test for water-vapor content of gaseous fuels; sampling manufd. gas; industrial 90, nitration and industrial-grades C6H6; refined, crude light, and crude heavy solvent naphthas; nitration and industrial-grades toluene; 5.degree., 10.degree., nitration, and industrial-grades xylene; test for acidity and acid wash color of C6H6, toluene, xylenes, solvent naphthas, and similar industrial aromatic hydrocarbons; test for Cu corrosion, distn., and paraffins of industrial aromatic hydrocarbons; test for solidifying point of benzenes; tests for sp. gr., color, H2S, and SO2 content of industrial hydrocarbons; test for thiophene in C6H6; hydrometer-thermometer field test and b.p. of engine antifreezes; tests for ash content, reserve alky., sp. gr., and water of concd. antifreezes; test for pptn. no. of lubricating oils; test for sapon. no. of petroleum products; test for Na in lubricating oil and lubricating-oil additives; test for sulfated residue from new lubricating oils; test for sulfated residue, Pb, Fe, and Cu in new and used lubricating oils; viscosity-temp. charts for liquid petroleum products; test for interfacial tension of oil against water; test for oxidation characteristics of inhibited steam-turbine oils; test for rust-preventing characteristics of steam-turbine oil in the presence of water; tests for elec. insulating oils, askarels, inorg. chlorides and sulfates in insulating oils, dielec. strength of insulating oils of petroleum origin, and gas content of insulating oils; test for power factor and dielec. const. of elec. insulating oils of petroleum origin; sampling elec. insulating oils;

test for sludge formation in mineral transformer oil; detection of free S in elec. insulating oils; purchase of uninhibited mineral oil for use in transformers and oil circuit breakers; analysis of Ca, Ba, and oil-sol. Na petroleum sulfonates; distn. test of plant spray oils; test for unsulfonated residue of petroleum plant spray oils; analysis of grease; apparent viscosity, cone penetration, and dropping point of lubricating grease; test for oxidation stability of lubricating greases; test for carbonizable substances in paraffin wax and white mineral oil; test for congealing point of pharmaceutical petrolatums; testing hydrocarbon waxes used for elec. insulation; m.ps. of paraffin wax, petrolatum, and microcryst. wax; test for oil content of paraffin wax; test for penetration of petrolatum; measurement of gaseous fuel samples; measuring temp. of petroleum and petroleum products; sampling natural gas; sampling and prep. aq. solns. of engine antifreeze for testing purposes; f.p. of aq. engine antifreeze solns.; detn. of pH of aq. solns. with glass electrode; designating significant places in specified limiting values; definitions of terms relating to sp. gr., screen, rheological properties of matter, and of conditioning and weathering; ASTM thermometers; and method of testing and standardization of etched-stem liquid-in-glass thermometers. Tentative revisions submitted in 1952 are given for: test for existent gum in gasoline.

IT 7704-34-9, Sulfur  
(analysis, detn. in elec. insulating oils)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

(analysis, detn. in lubricants and petroleum products  
(analysis, detn. in petroleum products)  
IT 7446-09-5, Sulfur dioxide  
(detn. of, in industrial hydrocarbons)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 13 (Chemical Industry and Miscellaneous Industrial Products)  
IT 7704-34-9, Sulfur  
(analysis, detn. in elec. insulating oils)  
IT 7704-34-9, Sulfur  
(analysis, detn. in lubricants and petroleum products)  
IT 7704-34-9, Sulfur  
(analysis, detn. in petroleum products)

IT **7446-09-5**, Sulfur dioxide 7783-06-4, Hydrogen sulfide  
(detn. of, in industrial hydrocarbons)

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46:12854 Original Reference No. 46:2267d-g Recovery of sulfur from flue gas by the use of ammonia. Craxford, S. R.; Poll, A.; Walker, W. J. S. Journal of the Institute of Fuel, 25, 13-14 (Unavailable)  
1952. CODEN: JIFUA4. ISSN: 0020-2886.

AB Before World War II, Simon-Carves and the Metropolitan Borough of Fulham proposed the use of NH<sub>3</sub> for scrubbing the gases emitted from elec. power plants, to reduce the pollution of the atm. by S oxides, and to recover the S in a useful form. They found it difficult to control the compn. of the scrubber liquid so that neither NH<sub>3</sub> nor SO<sub>2</sub> was lost with the scrubbed gas, but they invented an elec.-cond. vapor-pressure recorder to overcome this difficulty. A small plant is described for treating 1000 cu. ft. of flue gas per hr. from a Lancashire boiler, by using the vapor pressure recorder. As a scrubber this plant was entirely satisfactory, and when the compn. of the liquor was right, the concn. of SO<sub>2</sub> in the exit gas was found regularly to be as low as 0.0005%, corresponding to the removal of some 99% of the SO<sub>2</sub> in the flue gas. The control of the compn. of the liquor was difficult at first, owing to the building up of excessive concns. of sulfites and bisulfites, but the addn. of a little oxidation catalyst (MnSO<sub>4</sub>) overcame this difficulty. Later, it was found that Fe oxide in the system served the same purpose. The liquor is converted into S and a soln. of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> by heating in an autoclave at 190.degree. with the requisite amt. of H<sub>2</sub>SO<sub>4</sub>. The results were so successful that a plant for treating 25,000 cu. ft. per hr. of flue gas has been built and is now in operation at the Fuel Research Station.

IT **7446-09-5**, Sulfur dioxide  
(recovery of, from flue gas)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT **7704-34-9**, Sulfur  
(recovery of, from flue gases)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **7782-44-7**, Oxygen  
(removal of, from gases)

RN 7782-44-7 HCA  
CN Oxygen (8CI, 9CI) (CA INDEX NAME)

O=O

CC 21 (Fuels and Carbonization Products)  
IT Catalysts  
    (in oxidation, of sulfites in SO<sub>2</sub> recovery,  
    MnSO<sub>4</sub> as)  
IT Oxidation  
    (of sulfite, in SO<sub>2</sub> recovery)  
IT 7785-87-7, Manganese sulfate, MnSO<sub>4</sub>  
    (as catalyst in oxidation of sulfites in SO<sub>2</sub>  
    recovery)  
IT 7446-09-5, Sulfur dioxide  
    (recovery of, from flue gas)  
IT 7704-34-9, Sulfur  
    (recovery of, from flue gases)  
IT 7782-44-7, Oxygen 7783-06-4, Hydrogen sulfide  
11104-93-1, Nitrogen oxides  
    (removal of, from gases)